INTERNET DOCUMENT INFORMATION FORM

A . Report Title: National Missile Defense

B. DATE Report Downloaded From the Internet: 15 Sep 98

C. Report's Point of Contact: (Name, Organization, Address, Office Symbol, & Ph #:) **Department of the Army**
Research Development and Acquisition
Ft. Belvoir, VA

D. Currently Applicable Classification Level: Unclassified

E. Distribution Statement A: Approved for Public Release

F. The foregoing information was compiled and provided by:
DTIC-OCA, Initials: __PM__ **Preparation Date**: 15 Sep 98

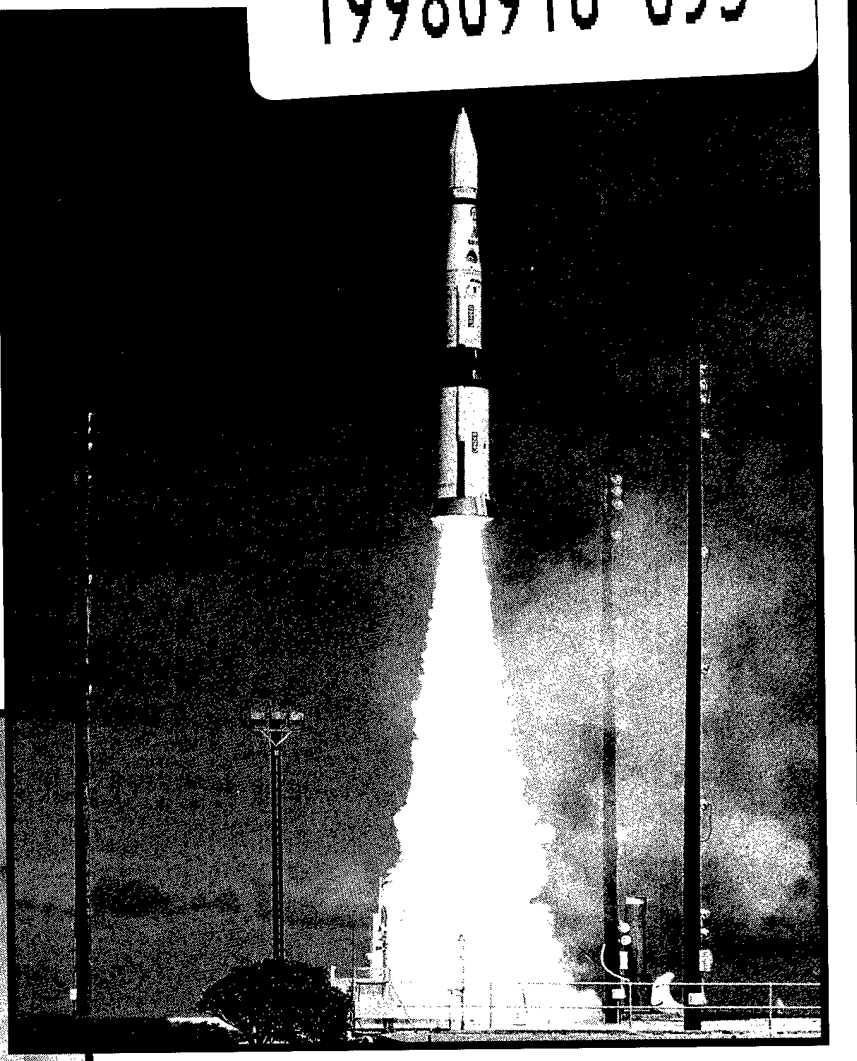
The foregoing information should exactly correspond to the Title, Report Number, and the Date on the accompanying report document. If there are mismatches, or other questions, contact the above OCA Representative for resolution.

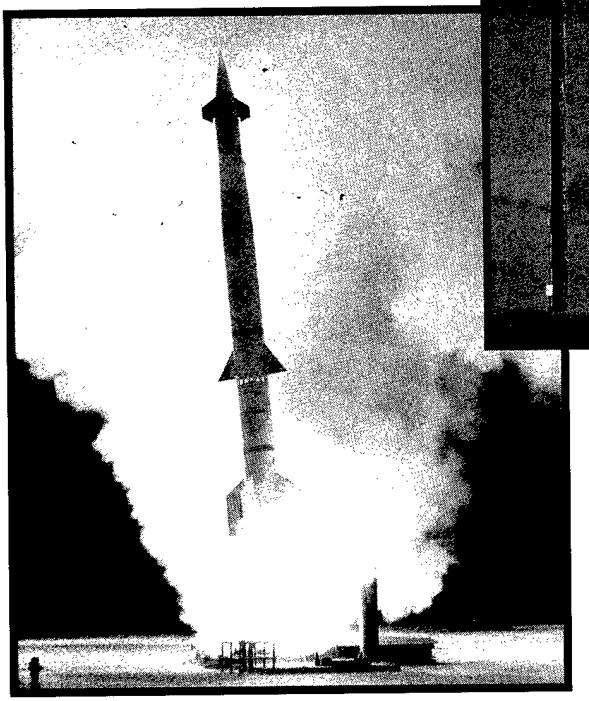
Headquarters Department of the Army
PB-70-97-6

ARMY RD&A

NOVEMBER - DECEMBER 1997

NATIONAL MISSILE DEFENSE

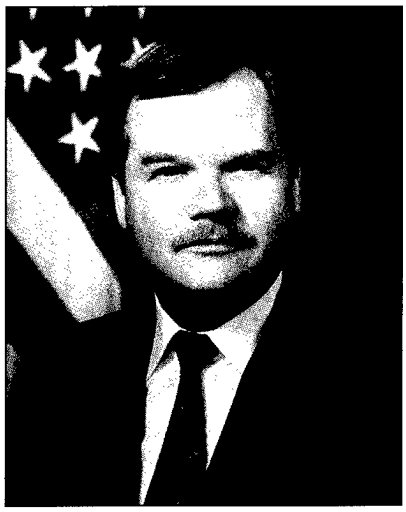




Also In This Issue:

- Winning The Year 2000 "War"
- The Army Acquisition Workshop
- AMC's New Systems Acquisition Deputies

FROM THE ARMY ACQUISITION EXECUTIVE. . .



National Missile Defense
Responding to the Threat

Missile warfare is not new. Countries that currently have a missile capability seek to improve and extend it. Countries without a missile capability are seeking to purchase or develop the relevant technology. What makes a difference today is the potential devastation caused by weapons of mass destruction—nuclear, biological, and chemical—delivered by ballistic missiles with increased range, carrying capacity, and accuracy.

The intelligence community believes it unlikely that any country, other than the major declared nuclear powers, will develop or otherwise acquire a ballistic missile capability that could threaten the continental United States in the foreseeable future. At present, analysts report only a North Korean missile in development, the Taepo Dong 2, could conceivably have sufficient range to strike portions of Alaska or the far-western Hawaiian Islands. However, the likelihood of it being operational within the next five years is very low.

The threat of an accidental or unauthorized launch from the nuclear nations exists, but it is considered a remote possibility. Intelligence community assessments indicate these systems are controlled by their national leaders. In addition, the number of former Soviet strategic ballistic missiles, the number of bases and submarines where the missiles are located, and the number of countries where missiles are based are being reduced by the Strategic Arms Reduction Treaty and the Cooperative Threat Reduction Program. Such reductions in the strategic missile threat to the United States also reduce the opportunities for accidental or unauthorized launch. Furthermore, the 1994 Clinton-Yeltsin agreement required the detargeting of Russian nuclear ballistic missiles. Such detargeted missiles could not be launched accidentally or, if launched, would land in the ocean. Retargeting would require the approval of the Russian national command authority.

Nevertheless, we cannot be complacent by these assessments. The fact remains that our nation has always been vulnerable to a long-range ballistic missile attack. We should prepare now to defend ourselves against such a potential in the complex and unpredictable 21st century. National Missile Defense (NMD) is our insurance policy. This program is highly evolutionary and flexible to allow us to respond to a strategic missile threat as it emerges.

The NMD program goal is to demonstrate by 1999 the elements of an initial system that could be deployed within the following three years if required by an analysis of the threat. If a deployment is not deemed necessary, the program will continue to improve the system while keeping it ready for deployment within any subsequent three years. The program is structured to create a technology and programmatic foundation which could be built upon if intelligence indicated that a strategic threat was emerging. The national goal will be to field a defense before any threat becomes operational.

The United States will not make a decision to deploy a National Missile Defense until a threat has been identified. Deploying before the threat emerges would deprive us of deploying the most advanced technology possible if and when a threat does later emerge. It would also mean allocating scarce procurement resources on NMD that could otherwise have met more urgent modernization needs.

Developing NMD capabilities to provide protection against a ballistic missile attack is a high national priority. If deployment is required, the NMD system could help protect the United States and, therefore, deter such an attack. System development itself may actually reduce the strategic value of long-range ballistic missiles and, thereby, reduce a potential enemy's will to acquire or use them.

America's Army has an important role in NMD development. The Army program focuses on NMD ground-site activities with the ultimate goal of providing a comprehensive ground-based defense. The NMD Joint Program Office is headed by Army BG Joe Cosumano, the Program Manager, who has the authority and responsibility to create the management structure to achieve multi-Service interoperability. America's Army is proud to have such an important role in the nation's most fundamental security requirement—to defend our homeland.

ROBERT M. WALKER

NOVEMBER-DECEMBER 1997
PB 70-97-6

To contact the Editorial Office call (703) 805-1035/36/38 DSN 655-1035/36/38. Articles should be submitted to: DEPARTMENT OF THE ARMY, ARMY RDA, 9900 BELVOIR RD SUITE 101, FORT BELVOIR VA 22060-5567. Our fax number is (703) 805-4218. E-mail: bleicheh@aaesa.belvoir.army.mil

Army RD&A **(ISSN 0892-8657) is published bimonthly by the Office of the Deputy Director, Acquisition Career Management. Articles reflect views of the authors and should not be interpreted as official opinion of the Department of the Army or any branch, command, or agency of the Army. The purpose is to instruct members of the Army Acquisition Corps and Workforce relative to RD&A processes, procedures, techniques and management philosophy and to disseminate other information pertinent to the professional development of the Army Acquisition Corps and Workforce. Private subscriptions and rates are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 or (202)512-1800. Periodicals official postage paid at Fort Belvoir, VA, and additional post offices. POSTMASTER: Send address changes to DEPARTMENT OF THE ARMY, *ARMY RDA*, 9900 BELVOIR RD SUITE 101, FORT BELVOIR, VA 22060-5567. Articles may be reprinted if credit is given to Army RD&A and the author. Unless otherwise indicated, all photographs are from U.S. Army sources. Approved for public release; Distribution is unlimited.**

This medium is approved for the official dissemination of material designed to keep individuals within the Army knowledgeable of current and emerging developments within their areas of expertise for the purpose of enhancing their professional development.

By order of the Secretary of the Army:
DENNIS J. REIMER
General, United States Army Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the Secretary of the Army
04051

Research Development Acquisition ARMY RD&A

Professional Publication of the RD&A Community

FEATURES

DEPARTMENTS

COVER

National Missile Defense (NMD) is a DOD joint program to protect against ballistic missile attacks. The cover shows a 1970s vintage Spartan Missile (left) and the current Payload Launch Vehicle, which will be used through the year 2000 for NMD live-fire tests.

NATIONAL MISSILE DEFENSE

What Is It And What Is The Army's Role?

By COL Jeffrey Schrepple and Barry Pike

Introduction

The end of the Cold War greatly reduced the threat of a large-scale nuclear attack on the United States. However, the world's nuclear powers still hold thousands of nuclear weapons, along with many hundreds of strategic ballistic missiles to deliver them, and many other countries are acquiring ballistic missiles and the technology for the weapons of mass destruction.

Although it may take as long as 15 years for a third world country to indigenously develop an intercontinental ballistic missile (ICBM) capable of striking the United States, there is great uncertainty as to how quickly this could be achieved through proliferation of technologies, components, or systems or with other technical assistance.

Whether from an intentional launch from a rogue nation such as Iraq, Libya, or North Korea, or an accidental or unauthorized launch from Russia or China, our nation has no means of defending itself from even a single incoming warhead delivered by an ICBM. This is the current environment, despite the fact that an anti-ballistic missile system was operational for a brief time in 1975-1976 and improved technologies for an even better system exist today. It is ironic that, because of the visibility of that SAFEGUARD system and the televised use of the PATRIOT system in Desert Shield/Desert Storm, the majority of Americans are convinced that such a defensive system already exists.

System Description

National Missile Defense (NMD) is the Department of Defense (DOD) joint program to develop a fixed, land-based, nonnuclear missile defense system that, when fielded, will protect the United States against limited strategic ballistic missile attacks. The NMD System will be capable of multiple, simultaneous, over-the-horizon engagements at long ranges and high altitudes outside the earth's atmosphere for highly effective protection of all 50 states.

The NMD System now being developed includes ground-based interceptors (GBI); a ground-based radar (GBR); and battle management/command, control, and communications (BM/C3). It will operate in conjunction with the Integrated Tactical Warning and Attack Assessment System in Cheyenne Mountain and other space—and ground-based early warning systems.

These early warning systems include the existing Defense Support Program (DSP) satellites, the DSP follow-on known as the Space Based Infrared System (SBIRS), new X-band radars (XBR), and existing early warning radars which would require hardware and software upgrades to improve their capabilities. These Upgraded Early Warning Radars (UEWR) may be unnecessary if the NMD System fielding takes place after 2006, when the SBIRS High and Low satellites are expected to be operational. While the SBIRS Program is closely linked to the NMD Program, it is funded and managed by the Air Force and will not be discussed further in this article.

The GBI, the "muscle" of the system, is being developed as a dormant, long-range, high-velocity missile consisting of an Exoatmospheric Kill Vehicle (EKV) on a multiple-stage solid rocket booster. The GBIs will ensure reliable hit-to-kill destruction of reentry vehicles during their midcourse phase of flight.

The EKV has a sensitive, multiple-waveband, long-wave infrared sensor that provides an on-board discrimination capability which allows the GBI to designate and intercept the lethal object in a target complex or cluster. To enhance the probability of target kill and overall system performance, the EKV will receive in-flight target updates and a target object map generated by the BM/C3 from sensor data. The GBI element also includes the necessary command, launch, and ground support equipment.

The GBR, the "eyes" of the ground-based element, is being developed as a wide bandwidth, solid-state, X-band, phased array radar sized for the NMD mission and capable of precision, long-range detection, acquisition, tracking, and classification of strategic ballistic missile target suites. It will also be capable of providing kill assessment data to the BM/C3.

This radar uses the same solid-state transmit/receive modules as the Theater High Altitude Area Defense (THAAD) radar and some common software and hardware, as well. This commonality has saved the program at least $60 million to date. Unlike THAAD, the GBR will be fixed-based and have a significantly larger aperture to provide the substantially longer range necessary to operate against strategic targets. The XBRs could also leverage the GBR effort, resulting in further cost savings.

The BM/C3 (see Figure 1), the "brains" of the system, is being developed to provide a highly automated engagement planning capability with appropriate decision aids to support the human system operators in effectively monitoring and employing the

system. The BM/C3 will be distributed in the command centers supporting the U.S. Space Command in Colorado Springs and at the NMD site with redundant capabilities as necessary.

It provides the equipment, communications, operation, procedures, and personnel essential for planning, directing, and controlling operations of assets assigned to the NMD mission. It also provides the capability for the National Command Authorities, via Human in Control, to exercise centralized command and control of NMD forces with decentralized mission execution through the Service component commands of the U.S. Space Command.

Program Status

The 1995 DOD Ballistic Missile Defense Program Review upgraded NMD from a Technology Readiness Program to the current Acquisition Category 1D Deployment Readiness (or "3+3") Program. On Feb. 16, 1996, then Secretary of Defense William Perry stated that this change would "enable the U.S. to develop within three years, elements of an initial NMD System, that could be deployed within three years of a deployment decision."

The "3+3" approach does not definitively commit DOD to deploy a system after the 1999 Integrated System Test—in fact, procurement and fielding of NMD are not funded in the Future Years Defense Program. Rather, once the capability has been demonstrated, periodic reviews (the first in 2000) of the current threat would be conducted to determine whether system deployment in the succeeding three years would be warranted.

If the decision at any given review is not to deploy, then the program is to maintain a capability to deploy during any three- year period, while continuing to improve the robustness and performance of the system by technology insertion. Regardless of when the system is deployed, it is DOD policy that development of the NMD System will be compliant with the Anti-Ballistic Missile Treaty; however, the actual deployment may not be, depending upon the nature of the threat.

In April 1996, then Under Secretary of Defense Dr. Paul Kaminski directed that the Ballistic Missile Defense Organization (BMDO) establish a Joint Program Office (JPO) to lead the development of NMD with participation from the Services. In September 1996, the Service Acquisition Executives and the BMDO Acquisition Executive signed a Memorandum of Agreement (MOA) describing the management roles and responsibilities regarding this Joint NMD Program. In April 1997, the NMD JPO was officially formed in BMDO under the direction of Army BG Joseph Cosumano (Army).

Substantial progress is being made toward achieving the "3+3" Program goals.

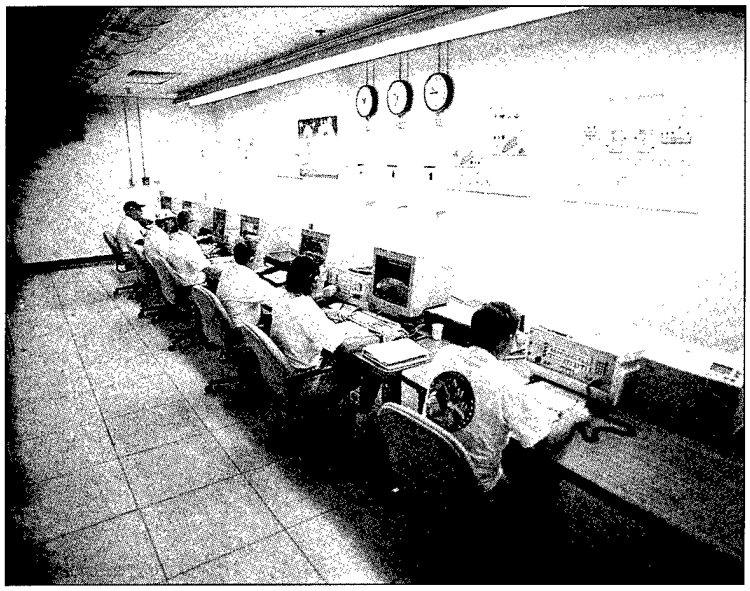


Figure 1. Battle management/ command control, and communications operations during integrated flight test.

The first flight test of an EKV sensor was successfully accomplished on June 23, 1997. The EKV sensor developed by Boeing North American successfully acquired, tracked, and collected data on multiple objects representative of the threat. Lockheed Martin successfully launched the Boeing EKV sensor on the Payload Launch Vehicle (PLV) from the U.S. Army Kwajalein Atoll (USAKA) (see Figure 2) to observe the target suite launched from Vandenberg Air Force Base in California. Hughes Missile Systems Corporation is also building an EKV sensor, which will be flight tested in January 1998.

Intercept flight tests of the two competing EKV contractors will occur in 1998-1999 prior to the downselect decision and the integrated system flight test in 1999. A dedicated, operational GBI booster is expected to replace the PLV by the year 2000.

The first capability increment of the BM/C3 developed by TRW operated successfully in shadow mode during the EKV sensor flight test. The early warning system and other surrogate and test range sensors also operated successfully during this test.

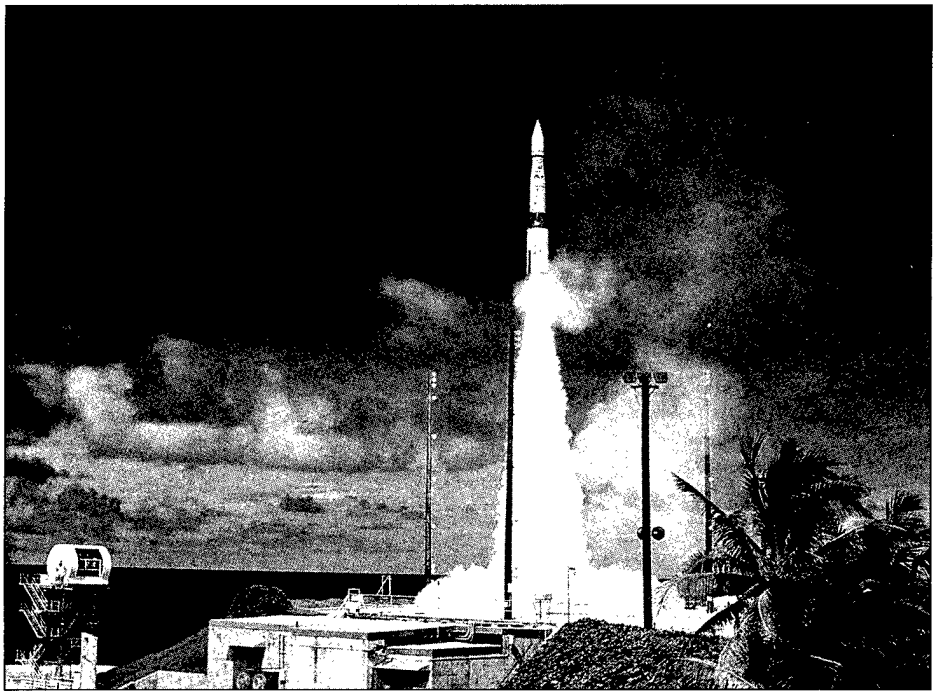


Figure 2. Payload Launch Vehicle.

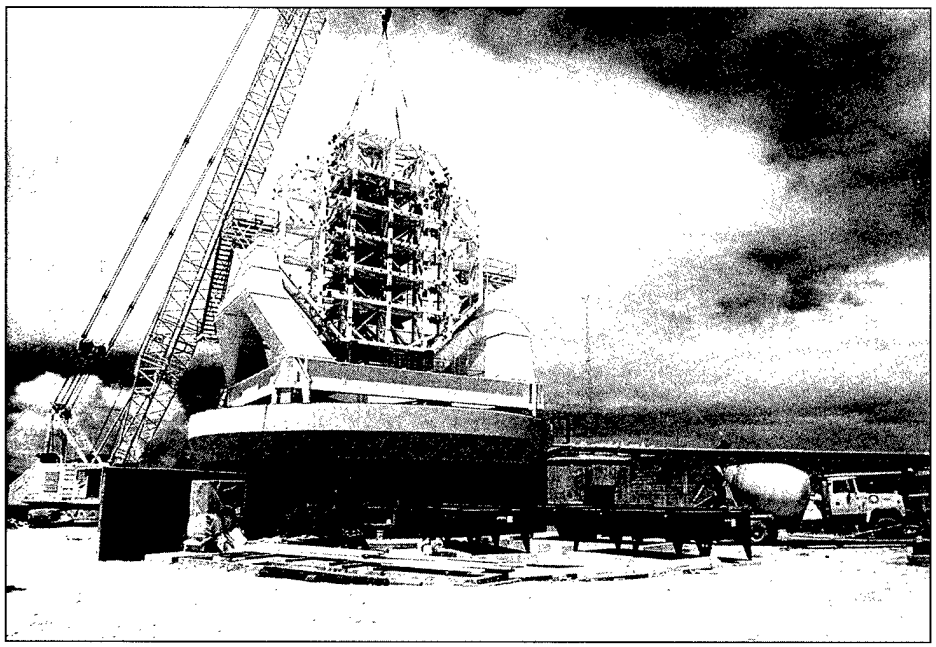


Figure 3.
Ground-based radar construction at Kwajalein Atoll July 2, 1997.

Construction of the GBR prototype (GBR-P), being developed by the Raytheon Corporation, began in September 1996 at USAKA. Facilities for the GBR-P are now more than 85 percent complete and the radar itself is about 25 percent complete (see Figure 3). The GBR-P will be ready to participate in NMD flight testing in December 1998 in preparation for the fully integrated system tests beginning at the end of 1999.

System Operation

While many different system architectures are possible—each tailored to a specific threat—a likely operational scenario (see Figure 4) starts with early warning detection of an ICBM launch by DSP or SBIRS with confirmation by at least one early warning radar. These early warning radars, which include the UEWRs and XBRs, provide accurate track information for cueing the NMD System and determining whether the ICBM will impact U.S. territory. This track information is passed to the BM/C3, which cues the GBR, calculates the intercept points and launch times for the GBIs, and fuses the available data to generate a target object map for the EKV.

After the "weapons free" command is issued and GBI launches are executed, the GBR provides the BM/C3 with additional high-quality track and discrimination information, which it uses to prepare in-

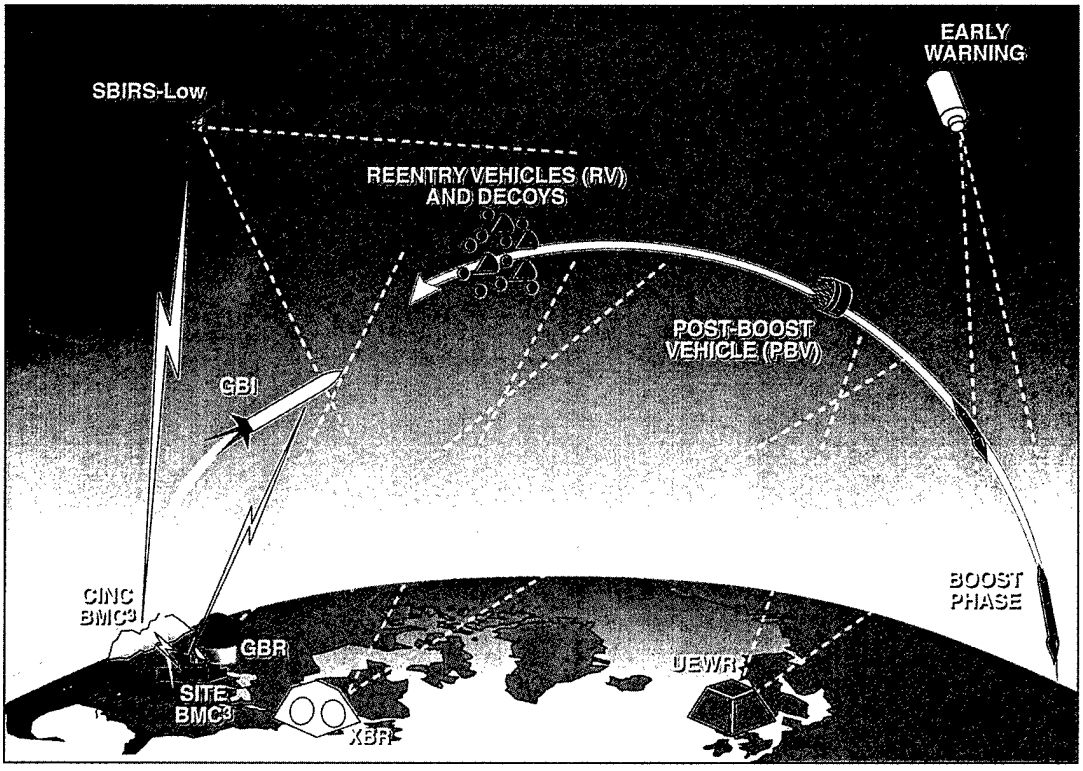


Figure 4.
National Missile Defense operational scenario.

flight target updates and a target object map. These updates will be transmitted to the in-flight GBIs over-the-horizon from the launch site via two of approximately four to eight In-Flight Interceptor Communications System (IFICS) ground stations.

In the end game, the EKV acquires the target suite, uses its onboard discrimination capability to correlate the target object map with the threat cluster, adjusts its trajectory accordingly, and destroys the lethal reentry vehicle by force of impact. On the ground, the GBR provides kill assessment data to the BM/C3 to allow additional GBI launches until the threat is destroyed or the "weapons hold" command is issued.

The Army's Role

The Chief of Staff of the Army, GEN Dennis J. Reimer, reaffirmed the Army's commitment to NMD in a December 1996 speech, stating that "the ground-based active defense portion of National Missile Defense is an Army mission." Through the development and testing of the long-range, ground-based detection and negation technologies currently being used in NMD and by the deployment and operation of the only anti-ballistic missile (ABM) system ever fielded by the United States, the Army has successfully discharged this mission for over 40 years.

The Army's template for the future, *Army Vision 2010,* also recognizes NMD's contribution to joint Full Dimensional Protection by declaring: "...the Army will provide the teeth of the missile engagement capability, to protect the U.S. land mass against its most serious external threat—missile attack."

The Army NMD Program Office (ANMD PO), which is requesting a name change to Ground Based Elements Program Office to avoid confusion with the NMD JPO, is a part of the NMD JPO team. The NMD JPO is headquartered in Washington, DC, and operates under a geographically distributed, federated approach in which the people are located where they can best manage the aspect of the program for which they are responsible. While the NMD acquisition strategy calls for the evolution to a Lead Systems Integration (LSI) prime contractor responsible for all development efforts, the NMD MOA guarantees that the Army element managers will continue to manage and maintain the cost, schedule, and performance accountability and responsibility for their NMD element development as an integral part of the overall NMD system.

Consistent with funding and guidance from the NMD JPO, the ANMD PO in the Program Executive Office for Air and Missile Defense, Huntsville, AL, manages the development of the ground based elements (i.e., GBI, GBR, and associated BM/C3) of the NMD System. The ANMD PO is led by a senior executive service member, Dr. Shelba Proffitt, who currently manages more than 70 percent of the NMD hardware and software development efforts.

At the time this article was written, the ANMD PO consisted of a GBI Office responsible for the development of the EKV and the surrogate PLV booster; a GBR Project Office responsible for the development of the GBR-P and associated radar technologies; and a BM/C3 Division (which is part of a BM/C3 Project Office located in Washington, DC) responsible for the development of the IFICS, the automated engagement planners, the communication network between NMD elements and nodes, and the BM/C3 test exerciser. The ANMD PO's Test and Evaluation Division conducts the detailed planning and execution of integrated flight tests and is developing the state-of-the-art, hardware-in-the-loop Integrated System Test Capability to conduct integrated ground tests which complement the flight test program. Finally, the ANMD PO's Acquisition Planning Division has been given the lead to develop the joint integrated logistics support and environmental compliance plans for the JPO. This program office structure and its management relationships will change somewhat in the near future as a result of discussions between BMDO and the Army; however, the final state had not been determined as this article went to press.

In addition to the major contributions in the materiel development arena, the Army has many other responsibilities in NMD. The U.S. Army Space and Missile Defense Command (SMDC) is the Army's proponent for NMD, provides most of the matrix support to the ANMD PO, develops the NMD targets and the supporting technologies for future NMD system improvements, is the Army NMD combat developer, and has recently been designated as the executive agent for the Joint Operational Requirements Document (ORD) approved in July 1997. The U.S. Army Space Command, a subordinate command of SMDC and also the Army component command of the U.S. Space Command, has been instrumental in developing the Capstone Requirements Document and the Concept of Operations for NMD.

The Army National Guard will likely man and operate the ground-based element of the NMD System when fielded. The National Guard Bureau, in conjunction with SMDC, is working aggressively on manning requirements. The U.S. Army Air Defense Artillery School authored the original NMD ORD in 1992 and the recently approved Joint ORD, as well as the initial supportability, manning, and training requirements.

The U.S. Army Aviation and Missile Command provides the remainder of matrix support to the ANMD PO, particularly in the areas of logistics and software engineering. The Office of the Assistant Secretary of the Army for Research, Development, and Acquisition and the Office of the Deputy Chief of Staff for Operations have made tremendous contributions in preserving the Army's leadership role in NMD and in ensuring an affordable and operationally effective system is developed and fielded when needed.

Conclusion

Effective National Missile Defense against limited ballistic missile attacks is attainable. With the establishment of the NMD JPO, the award of the LSI Concept Definition phase contracts, and a Defense Acquisition Board program review completed in August 1997, the programmatic transition from a Technology Readiness Program to a Deployment Readiness Program is nearly complete.

But even more important is the fact that people who have spent a lifetime on NMD are seeing the first integrated system tests for the program since the SAFEGUARD System was closed down in 1976. A real NMD kill vehicle sensor has been successfully launched against an ICBM warhead complex and collected data that will make future kills possible. A real, first-increment BM/C3 operated on-line throughout that successful test. And a real, state-of-the-art ABM radar is now under construction. The United States is finally on the threshhold of being able to affordably and effectively defend its homeland against a limited ballistic missile attack, and the Army, as a part of a joint team, can proudly claim its heritage and position as a key player in that effort.

COL JEFFREY L. SCHREPPLE is the Deputy Program Manager in the Army National Missile Defense (NMD) Program Office. He holds a B.S. from the U.S. Military Academy and two M.S. degrees—one in mechanical engineering, and one in material sciences—from Stanford University. He is a graduate of the Defense Systems Management College and the Army War College.

BARRY J. PIKE is a supervisory general engineer with the Army NMD Program Office. He holds B.S. and M.S. degrees in chemical engineering from Auburn University. He is a graduate of the Defense Systems Management College Program Management Course and is certified at Level III in the Program Management and Systems Planning, Research, Development and Engineering career fields.

NATIONAL MISSILE DEFENSE PROGRAM ACQUISITION STREAMLINING INITIATIVES

Acquisition Streamlining Initiatives In A Joint Environment

By LTC Craig M. MacAllister and Donald Keith

Introduction

The Joint Program Office (JPO) for National Missile Defense (NMD) has developed an innovative approach to procurement, bringing together widely dispersed and technically diverse government and contractor elements. The goal is to provide protection to the United States against a potential ballistic missile attack.

Two apparently irreconcilable circumstances drove the NMD JPO to adopt a new approach:

- Multiple contractors, working for multiple government agencies, are now developing the component parts of the NMD system, but
- A single contractor, working for a single government agency, is needed to

—Accept responsibility for system integration so the government is not required to be the integrator;

—Accept accountability for system performance;

—Respond quickly enough to prepare and, if necessary, field a system to meet an emerging threat; and

—Be flexible enough to continue development and maintain deployment readiness until a deployment becomes necessary.

The NMD JPO resolved this dilemma by contracting for a Lead System Integrator (LSI) (See Figure 1) who will:

- Integrate system components into an NMD system architecture;
- Assimilate existing contracts into a single "prime" contract;
- Assume the maximum possible degree of accountability for system performance;
- Develop and test an NMD system within three years;
- Have a contract option to support a deployment in another three years if a decision is made to do so; and
- Have a contract option to continue development and maintain deployment readiness until a deployment decision becomes necessary.

The LSI contractor will integrate all existing NMD development activities and initiate development of other elements as necessary. These elements may include a ground-based interceptor (GBI); a battle management command, control and communications system (BM/C3); and a set of tracking, acquisition, and missile control radars. The Space-Based Infrared System (SBIRS) (a U.S. Air Force procurement) will be a part of the NMD system, when available.

Three important innovations of the LSI procurement strategy are particularly noteworthy. First, the procurement uses only 22 pages to provide concise systems performance specifications compared to other DOD procurements that use more than 200 pages to provide detailed design specifications. This is a reduction by a factor of 10. Second, the use of a short Statement of Objectives (SOO) rather than the normal Statement of Work (SOW) approach allows greater flexibility in the contractor's program approach. Finally, electronic interaction using an LSI home page on the Internet provides rapid dissemination of news and updates about the Request For Proposal (RFP) to bidders.

The LSI procurement has two phases. The first phase, Concept Definition (CD), is a short phase designed to have industry involved and under contract as quickly as possible in order to meet the aggressive NMD schedule. This phase provides a basis upon which the two LSI offerors

ILLUSTRATION GLOSSARY	
BM/C3	Battle Management/Command, Control and Communications
EKV	Exoatmospheric Kill Vehicle
GBR-P	Ground-Based Radar Prototype
SBIRS	Space-Based Infrared System
IDC	Intergrated Development Concept

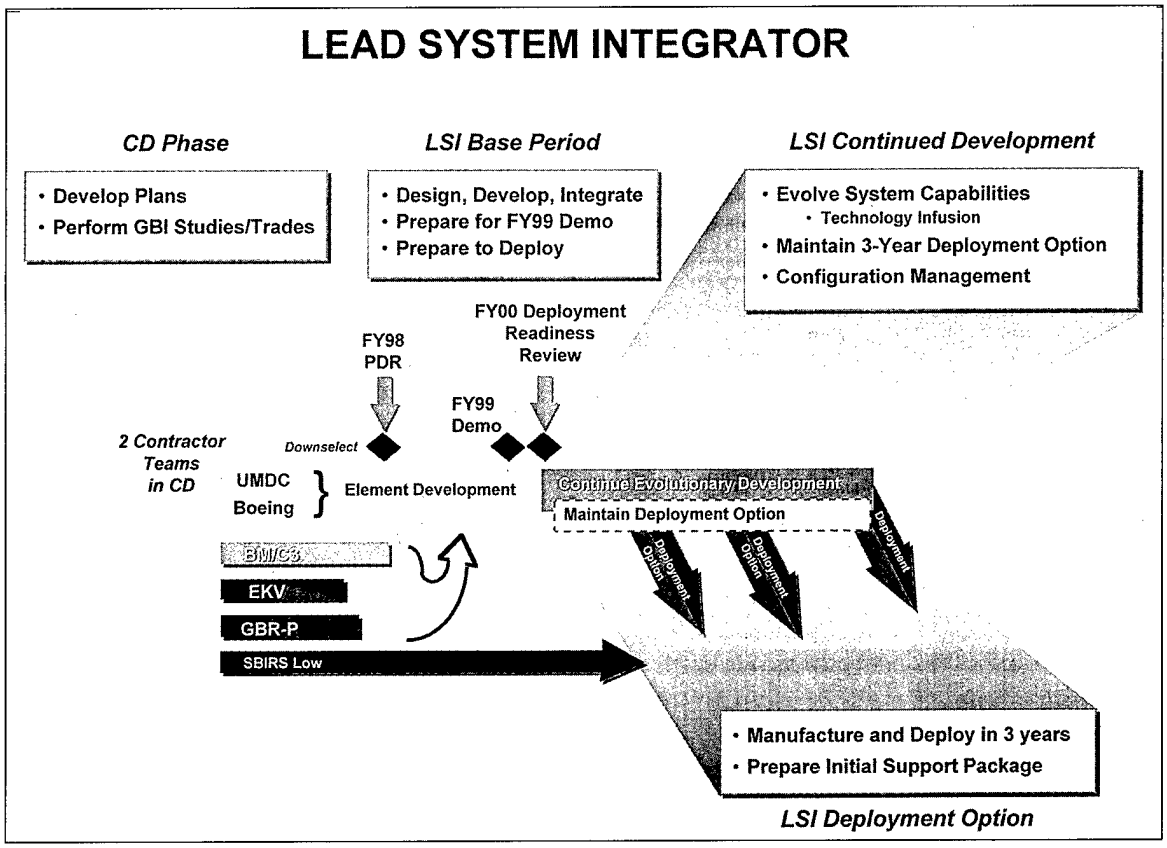


Figure 1.

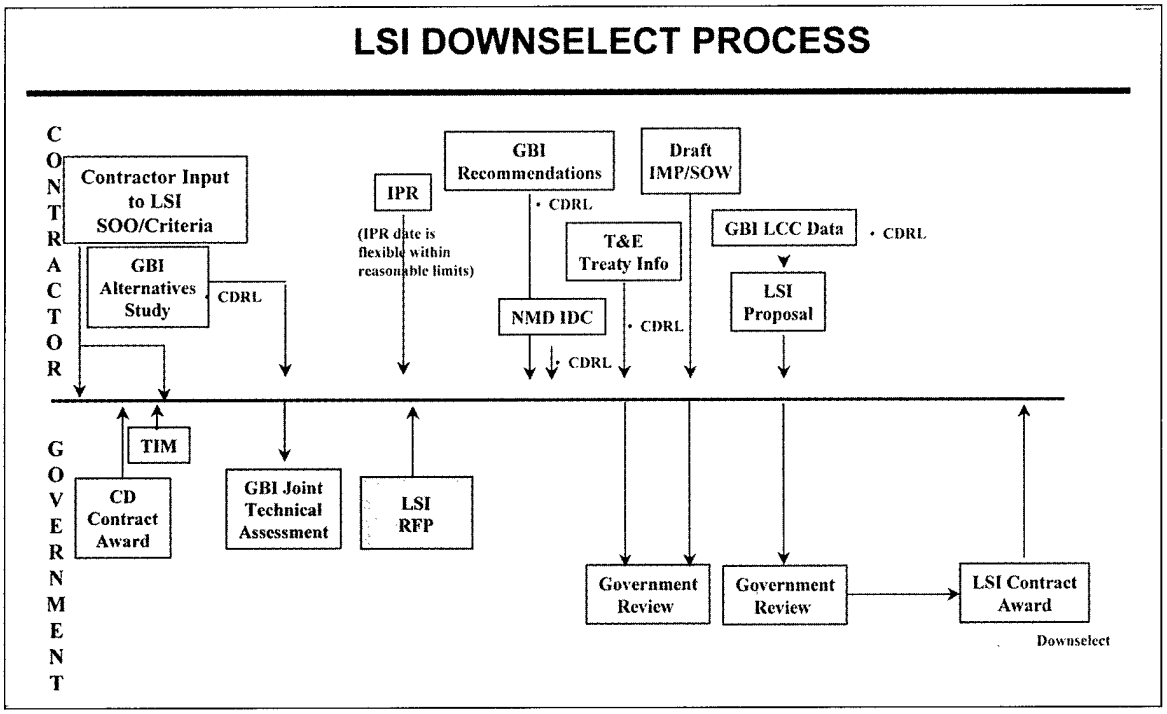


Figure 2.

develop their integration concepts. It will also result in industry teaming; early study of alternative booster solutions; and development of program plans from an industry perspective.

At the end of this initial phase, the government will downselect to a single contractor for the second phase, called the LSI Execution Phase, to build, integrate, and possibly deploy the NMD System.

The CD Phase emphasizes an iterative approach to proposal development and streamlines the procurement process accordingly. The development of a draft Integrated Master Plan (IMP) and SOW during the CD Phase will provide invaluable insight for government evaluators before source selection discussions begin with the offerors. Figure 2 shows the contractor and government schedule and process.

Background

On April 9, 1996, Dr. Paul G. Kaminski, then Under Secretary of Defense for Acquisition and Technology, directed the Ballistic Missile Defense (BMD) Acquisition Executive (AE) to:

- Establish an NMD JPO;
- Designate a program manager (PM); and
- Develop a management infrastructure to leverage Service expertise and support.

Dr. Kaminski stressed using Integrated Product Teams (IPTs) to foster vertical and horizontal program integration. The JPO PM's use of centralized control and decentralized execution for program tasks requires a horizontal "federated" management JPO structure. The NMD JPO was formed on April 1, 1997, with Army BG Joseph Cosumano designated as DOD's first NMD PM. The Service product managers of the system's elements report directly to the JPO PM. The JPO integrates the development of all NMD hardware and software.

The JPO PM was authorized to issue an LSI RFP to obtain industry's proposed solutions and costs to satisfy the NMD's technical integration challenge. To obtain competitive views, the government will evaluate two contractor proposals over a 4-month period. The goal is to select the most appropriate contractor concept, timeline, and plan to accomplish the NMD system development/integration. Accordingly, work performed during the 6-month CD Phase will form the basis for the actual follow-on long-term contract.

Acquiring An NMD Systems Integrator

On April 9, 1997, Dr. Kaminski announced that the NMD Technology Readiness Program would transition to an Acquisition Category 1D NMD Deployment Readiness Program. The new program is a threat driven strategy referred to as the NMD "3+3" concept. The "3+3" concept is designed to develop and demonstrate an ICBM defense capability within three years of the program's initiation. If necessary, the program will deploy an initial defense capability within an additional three years. The first three years of development will include an integrated system test in FY99 and culminate with a Deployment Readiness Review in FY00. If an NMD deployment decision is not forthcoming, then the NMD Program will continue development as an evolutionary, reduced-risk acquisition and protect the option to field an NMD system within three years. The NMD Program acquisition goals are to:

- Evolve individual NMD element technology developments into a single integrated system development, ready for deployment by FY00;
- Move from government integration activities to increased contractor technical accountability;
- Plan, design, and develop an NMD system to satisfy system performance requirements;
- Conduct a successful FY99 Integrated System Test to demonstrate an initial NMD capability;
- Develop and maintain a plan that protects a viable three-year NMD system deployment option; and
- Provide flexibility to deploy and continue system improvements.

Acquisition Reform And Streamlining Initiatives

During the formative stage of the LSI procurement, a concerted effort was made to ensure that acquisition reform tenets were incorporated into all LSI Phases. Some of the LSI acquisition streamlining initiatives, taken from the Federal Acquisition Reform Act of 1995 and other DOD policies and regulations, are detailed below. The LSI initiatives were tailored to the unique joint program environment of the NMD Program and represent a significant investment on the government's part.

The NMD LSI RFP for the CD Phase implemented many DOD acquisition reform and streamlining initiatives. These include the following:

- ***Integrated Product and Process Development Teams.*** The NMD Program makes extensive use of OSD oversight and an IPT infrastructure. Five teams are in place. Program IPTs are flexible and will exist as long as necessary to satisfy their intended objectives. IPTs use principal NMD Program members to resolve issues, reduce risk, obtain quick consensus, and reduce decision-making time.
- ***Process Maturity and Business Practice Reforms.*** Relative to the LSI Program, preordained solutions are out. Management is seeking program "best value." During the CD Phase source selection, JPO evaluators used best commercial practices to scrutinize bidders' past performance and assess a company's ability to execute both the CD Phase and follow-on LSI Execution Phase. Evaluators used inputs from various government and commercial contracting activities. This evaluation was necessary because the LSI will become the single contractor program business decision authority vice the present numerous program offices. The single manager will control the configuration, balance systems requirements based upon system level trades, and respond to the government with a single voice.
- ***Concepts and Principles of Cost As An Independent Variable (CAIV).*** CAIV is a primary consideration when evaluating NMD elements and must address best value for the program. The NMD LSI CAIV Implementation Plan will provide offerors a target funding profile, along with a "3+3" schedule constraint. Each offeror will specify completion criteria tied directly to a fee schedule. This will markedly help achieve program balance regarding affordability, technical performance, and risk. As the program progresses, JPO management will provide incentives for innovative approaches that result in desired levels of performance ahead of schedule or at a reduced life cycle cost (LCC).
- ***Electronic Commerce.*** The NMD Program uses a highly acclaimed LSI home page (See Figure 3) on the Internet. Seventy-seven potential bidders received the RFP and subsequent procurement-related information. Near real-time "hot news" features appear regularly, as do updates to the draft RFP. Between Sept. 18, 1996, and Aug. 5, 1997, NMD management provided 80 separate hot news announcements that covered various subjects. Almost 500 answers to contractor questions went out simultaneously to potential vendors and CD contractors as hot news items. As of August 1997, four electronic versions of a 150-plus page draft RFP received contractor scrutiny via the Internet. This significantly reduced the time to develop the RFP, and helped to improve product quality. Contractor participation in the development of the RFP leads to a higher quality proposal that better satisfies government requirements. Improved proposals, in turn, reduce evaluation time. Finally, the cost of providing this information via the World Wide Web is significantly less compared to the conventional method of mailing this information to bidders.
- ***Digital Bidders Library.*** The NMD JPO used a CD-ROM "Bidders Library" for the LSI CD competition. This electronic media provided 89 references in electronic, reproducible format. The disks contained tens of thousands of pages of government information and reference mate-

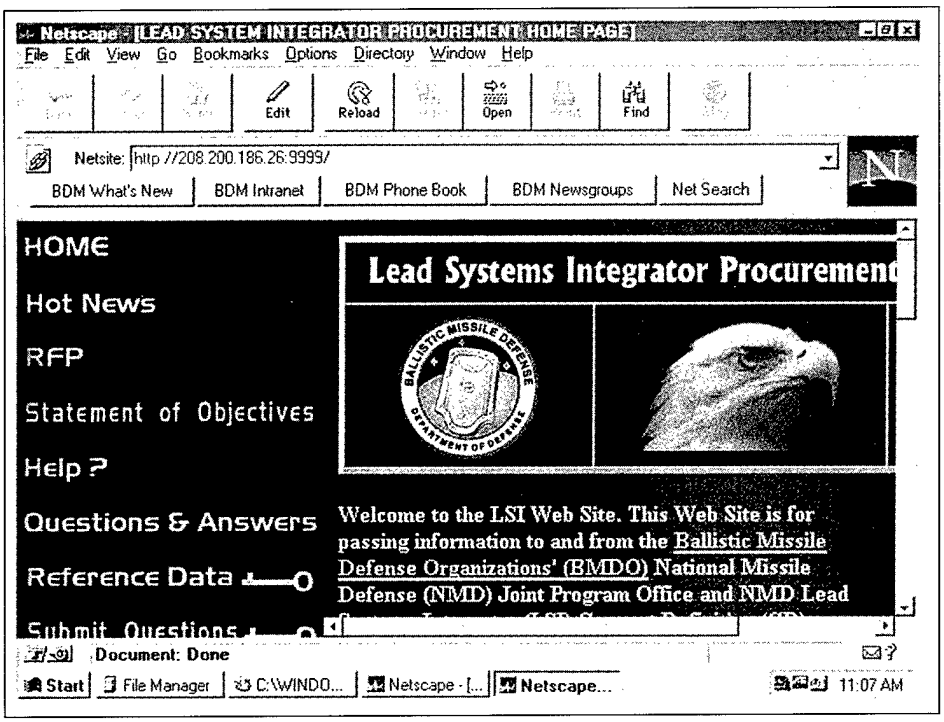


Figure 3.
LSI Home Page

rial. This effort resulted in substantial savings such as duplicating these pages for the 77 companies on the bidders list, mailing man-hours, thousands of dollars in postage and express mail charges and, ultimately, costs to dispose of unneeded or unread documents. Since award of the CD contract, hundreds of additional documents went to the competing contractors in digital format via a hot news announcement on the Internet. Only classified documents or those without soft copy were provided in paper format.

• ***Statement of Objectives (SOO).*** The JPO provided four-plus pages of top level program objectives in a SOO format rather than a multipaged, detailed explanation of program execution requirements in a traditional SOW format. This avoided specifying potentially thousands of embedded military specifications as part of a SOW. Additionally, this approach makes the LSI a partner in achieving the program objectives, rather than just an executor of a detailed government plan.

• ***Performance Focus.*** The JPO instituted use of "performance" specifications rather than detailed design specifications. Of the total NMD Systems Requirements document, only 22 pages provide LSI offerors concise systems performance specifications.

• ***Minimal Contract Data Requirements List/Contract Line Items (CDRL/CLINs).*** The NMD LSI CD RFP required delivery of only seven CDRLs on four CLINs. The government has one CLIN and six CDRLs for the follow-on contract and plans to allow the winning contractor to only propose additional necessary CDRLs that add value to the program or provide required information.

• ***A Single Acquisition Management Plan (SAMP).*** The NMD SAMP clearly describes DOD's plan for management of the NMD deployment readiness program. It sufficiently describes the NMD management plan to support OSD approval and continued support of the 3+3 program and its required management structure. Numerous functional elements were consolidated into a concise and consistent program management baseline.

• ***Paperless Source Selection Process.*** An effective automated source selection tool is in place. Government evaluators used a computer program called "FedSelect" for the CD Phase. FedSelect allowed evaluators to view the offerors' proposal on-line, enter their comments and ratings, and electronically return their individual results "up the chain" for consolidation. This enabled the evaluators to complete their work within one week.

• ***Technical Interchange Meetings (TIMs).*** JPO management is receptive to contractor requests for additional information. As such, three TIMs were established to provide a forum for information exchange between the contractors and the government. In addition, each contractor was permitted to have private, biweekly, one-on-one meetings with the JPO. As a result of these actions, three on-site information briefings were added to the TIM schedule, and an additional 100-plus documents were provided to the contractors.

Conclusion

The NMD Program represents a mandate for acquisition streamlining. The development and potential deployment of a cost-effective NMD system demands that the LSI execution contractor have maximum flexibility to develop the NMD system, providing real impetus and support for the acquisition streamlining process on the LSI Program. The initiatives discussed in this article are only the beginning. Additional initiatives to ensure program success will be added after LSI contract award in February 1998. The development and production of the NMD system will also require similar innovations to ensure an on-time, successful fielding. LSI contractors will propose taking these steps in their proposals.

LTC CRAIG M. MACALLISTER (USA) is the Senior System Integrator for Lead System Integrator Procurement at the NMD JPO. He holds a B.S. degree from the U.S. Military Academy, and an M.S. in aeronautical engineering and the aeronautical engineer degree from the Naval Postgraduate School. As an Army Acquisition Level III professional, and an Air Defense Artillery soldier, MacAllister has held numerous combat arms and acquisition positions in DOD.

DONALD KEITH (USA Ret. LTC) is Chief Logistics Engineer for the Defense Analysis Group at Science Applications International Corporation, Arlington, VA. He is presently working on the National Missile Defense Lead System Integrator Procurement. He holds a B.B.A. degree (Cum Laude) from the University of Wisconsin, Madison, and an M.B.A. degree (Summa Cum Laude) from Monmouth University.

WINNING THE YEAR 2000 WAR

By Miriam F. Browning

Bottom line: Army managers are responsible for identifying, fixing, testing, and certifying that ALL systems and information technology controlled devices in their area of responsibility are Year 2000 compliant.

Click and point to Saturday, Jan. 1, 2000...

Possible major world headlines:

"Celebration At Eiffel Tower Includes Parade By French NATO Troops"
"Disney Wins Major Army Advanced Warfighting Experiment Contract"
"Bill Gates Becomes Governor Of 51st State"

What is the best thing about these headlines? It is that there is no mention of any critical Army systems failures due to the Year 2000 (Y2K) problem. If all goes well and Army commands, program executive officers (PEOs), independent program managers, and Headquarters, Department of the Army (HQDA) functional proponents aggressively follow the guidelines for fixing Y2K problems, the Army will be able to congratulate itself on the successful accomplishment of one of the most massive information technology projects ever handled by an organization.

Before the celebrations begin, however, the Army must identify, fix, test, and certify its systems and information technology controlled devices as Y2K compliant before Jan. 1, 2000. Winning the war consists of five major components. Each one requires a high degree of situational awareness by all Army managers and, most importantly, by the Army's systems community, general officers, and SES members.

The five major components are:

- Know the enemy;
- Develop a strategy;
- Engage the generals;
- Avoid no-win battles; and
- Ride the horse to the finish line.

A discussion of these components follows, as well as tips for all involved in the Y2K skirmishes on how to improve situational awareness.

Know The Enemy

The Year 2000 problem is pervasive worldwide. As the year 2000 dawns, many older computers, software programs, and communications devices may be susceptible to errors. The problem results from the nearly universal practice of using two digits rather than four digits to designate the calendar year. This old, two-digit code can lead to incorrect results whenever computer software performs arithmetic operations, comparisons, or data field sorting involving years later than 1999.

Software applications for systems such as finance and accounting, Medicare, Social Security, health services, personnel, logistics, and payroll are prone to Y2K problems, especially if they have been operating for many years. Other systems are not so obvious. These include military weapon systems, air traffic control systems, escalators and elevators, credit cards, biomedical devices, heating and air conditioning systems, and building security systems. Computers and communications devices are also Y2K impacted, especially if they are older.

Cost estimates to fix Y2K problems vary widely. Estimates for fixes worldwide range from $300 billion to $1 trillion, and from $10 to $30 billion to fix the problem in the federal government. In February 1997, the Office of Management and Budget (OMB) estimated the initial government-wide cost to fix Y2K was $2.3 billion. Cost estimates across the federal government have increased slightly since the initial OMB figures, attributable to more accurate assessments of the problem and the inclusion of more systems and information technology (IT) controlled devices.

In the summer of 1997, Army cost estimates to fix Y2K problems were approximately $500 million. This figure includes costs for weapon systems, Army-wide information systems, major command and installation unique systems, personal computers and servers, communications hardware and software, and facilities and infrastructure (e.g., building security systems, traffic systems, and heating and air conditioning systems.)

OMB has declared that within the federal government no new funds will be allocated to the agencies to fix their Y2K problems, leaving the government with existing dollars to solve the problem. DOD and Army policy reflects the OMB guidance and essentially means that the systems owners are responsible for taking money from their current programs and

applying that money toward their Y2K fixes.

The Army reports quarterly to OMB on the Y2K progress of approximately 400 critical systems, which are systems supporting a core mission or with substantial costs. Almost all Army weapon systems, major automated information systems, and large infrastructure pieces (e.g., switches) fall into this category.

Develop A Strategy

The Department Of The Army Goal Is To Ensure That No Critical System Failures Occur Due To Year 2000 Related Problems.

The Army approach to fixing Y2K mirrors the plan of action taken by other large organizations, i.e., strong central policy and oversight coupled with decentralized execution at the business operating units. Centralized management of Y2K is with the Army's Chief Information Officer (CIO), the Director of Information Systems for Command, Control, Communications, and Computers, located in the Office of the Secretary of the Army. Decentralized execution is by Army systems owners: major commands, PEOs, independent program managers, and HQDA functional proponents.

The Army Y2K management plan is the centerpiece of the Army's Y2K strategy. It contains information for fixing Y2K and is compatible with the DOD Y2K plan published in April 1997. Specifically, the plan:

- Requires the Army to use the federal government's five phase resolution process to resolve Y2K problems. The five phases are:

1. Awareness (Educate)
   (December 1995 - December 1996)
2. Assessment (Identify)
   (March 1996 - March 1997)
3. Renovation (Fix)
   (December 1996 - September 1998)
4. Validation (Test)
   (March 1997 - December 1998)
5. Implementation (Compliant)
   (June 1997 - December 1998)

- Mandates that the Army will, in most instances, use the DOD standard for date format (YYYYMMDD). There are exceptions in the areas of electronic commerce and selected logistics systems interfaces.
- Requires that the Army Technical Architecture be compliant with the DOD date standard.
- Directs that systems undergoing Army Systems Acquisition Review Council (ASARC) or Major Automated Information System Review Council (MAISRC) review address Y2K compliance.
- Recommends that systems, especially legacy ones with Y2K problems, be considered for early retirement if that is a reasonable alternative.
- Recommends that the Army take advantage of commercial-off-the-shelf (COTS) or government-off-the-shelf (GOTS) solutions whenever practical to fix Y2K problems.
- Lists HQDA, major command, PEO, and independent program manager responsibilities for fixing Y2K problems.
- Provides cost estimating guidance based on DOD and industry developed metrics.
- Lists the data elements required for the Army's Y2K data base, which then electronically feeds into DOD and OMB Y2K data bases.

Engage The Generals

The top executives in the Army have issued explicit guidance in the war on Y2K. On March 31, 1997, the Chief of Staff of the Army and the Secretary of the Army signed a memo, subject: *Year 2000 Fixes—Top Priority*, stating the Army's Y2K policy. Specifically:

1. Fixing the Year 2000 problem is important for the Army warfighting mission and Army credibility with the American public.
2. Year 2000 fixes must be made before new system enhancements are accomplished.
3. There will be no new funding for Year 2000
4. Year 2000 is an opportunity to eliminate unnecessary systems.

In 1996, DOD and Army officials established policy regarding Y2K and contracts. The Army's Acquisition Executive directed contracting offices to modify existing contracts to include Y2K complaint language and to include Y2K complaint language in new contracts. The Assistant Secretary of Defense for Command, Control, Communications and Intelligence policy requires that DOD components review all contracts to determine whether products are Y2K compliant and to issue stop work orders for existing contracts for products that fail to meet Y2K compliance requirements. Finally, the Army and DOD Y2K management plans state: "DOD will buy only Y2K compliant products."

The Army's Auditor General and the Army's Inspector General will assist Army systems owners in meeting their Y2K schedules and will provide accountability information in these areas to the Army CIO. The Army Audit Agency is identifying and reviewing high risk areas, e.g., critical systems' progress, contingency plans, costs, and testing. Results of these reviews are provided to the systems owners and the Army's CIO. The Inspector General will be doing similar reviews on the non-critical systems and IT controlled devices.

Avoid No-Win Battles

Those individuals who understand the problem, maintain a high degree of situational awareness, and are committed to fixing Y2K will fare well and reach the finish line before the millennium. Again, nothing less than hard work and vigilance are required. The following no-win battles should be avoided by Army individuals responsible for fixing Y2K.

- *Denial*

The federal government has been slow to recognize and fix the Y2K problem. Its bureaucracy, size and complexity, and late start (there are exceptions such as the Social Security Administration) contribute to its laggardness. A complicating factor

MAJOR Y2K WEB SITES

- Army Y2K Restricted Homepage: http://www.army.mil/army-y2kr
  (Inquire at army-y2k@hqda.army.mil to obtain access)
- Army Year 2000 Homepage: http://www.army.mil/army-y2K
- Army Technology Integration Center: http://rogue.cec.army.mil/y2k/
- DOD DISA Homepage: http://dist.disa.mil
- Air Force Y2K Homepage: http://infosphere.safb.af.mil
- DISA, Joint Interoperability Test Command (JTIC):
  http://www.disa.mil/cio/y2k/jitc2000
- GSA: http//www.itpolicy.gov/
- Mitre Corporation: http://www.mitre.org/research/y2k
- Information Technology Association of America: http://www.itaa.org/
- DeJager Y2K Information Center: http://www.year2000.com

is the belief of some that the problem doesn't really exist in "my area," that "even if it does exist I can muddle through it," or, last but worst, "if I do nothing it will go away." This attitude won't work for Y2K. Y2K problems are real, and they affect the core systems of the federal government.

Bottom line: Army managers are responsible for identifying, fixing, testing, and certifying that ALL systems and IT controlled devices in their area of responsibility are Y2K compliant. The performance of systems for Army soldiers and civilians and the credibility of the U.S. Army to the American public are on the line.

• *Goldwatches and Whines*

Since there is no new money to fix Y2K, some individuals may spend more time gaming the system than fixing the Y2K problem. The classic goldwatch approach of "I'll fix Y2K but then don't expect me to secure this nuclear warhead" won't compute. The same is true for those who complain and send their requests for additional funds for Y2K to the next higher headquarters while at the same time harboring old or duplicative systems which are no longer of value to them or the Army. There are two compelling reasons why these approaches will waste valuable time. The first is the balanced budget agreement approved by both the White House and the Congress. Allocating additional dollars to fix the government's Y2K problem is not part of the agreement. The second is the Army's Y2K policy which strongly encourages Army systems owners to eliminate unnecessary systems. This basic and needed housecleaning drill is the perfect opportunity to gain efficiencies and dollars for the Army. Requesting additional dollars for Y2K when old, unnecessary systems costs continue to exist is not viewed by Army executives as good management.

• *The Silver Bullet*

Most people engaged in the information systems business are well aware of the fact that solutions to technical problems are typically multifaceted and require a combination of diverse technical tools and brainpower. However, there are too many individuals, sadly sometimes in executive positions, who believe the silver bullet patois of technology marketeers.

In the case of Y2K, there are no universal solutions, and the solutions that do exist are labor intensive and getting more expensive every day due to the increasing costs of scarce Y2K programmers. If someone has a solution for your Y2K problem, do what you would do if you were remodeling a house. Ask the contractor for details of the proposal, evidence of proven past performance, and demonstrated knowledge of your particular Y2K problem.

• *Lawyers to the Rescue*

Instead of rolling up their sleeves and fixing the problem, there are those individuals who believe that legal technicalities will quickly and magically transfer the responsibility for fixing and paying for Y2K to someone else. This mindset can be viewed as the legal silver bullet.

Responsible lawyers provide two pieces of advice to their clients with a Y2K problem. First, fix the problem and avoid any liability. Second, if the people or firms who caused the problem can be identified, it may be appropriate to seek recompense from them, but clearly fix the problem first. Also note that there is no Jan. 1, 2000 drop dead date on litigation.

Legal issues regarding Y2K fixes will continue to be debated in terms of the magnitude of the legal problem, the efficacy of suing to recover costs, contract language, and out of court settlements. In addition, Y2K publicity makes it difficult for anyone to argue that an outside software provider should pay for a problem that they willfully ignored. More fundamental, though, is the fact that no responsible Army manager would get the Army in a position where it is liable for a critical system failure or inaccuracy due to the fact that the Army is awaiting a legal opinion on who fixes and pays for a Y2K problem.

Ride The Horse To The Finish Line

Any successful warrior or athlete knows that winning involves preparedness, practice, and endurance. These same characteristics prevail in winning the Army's Y2K war. The five phase resolution process provides a framework to manage Y2K problem resolution. Especially critical are the last two phases, testing and certification.

Systems owners are required to develop a test plan for each of their systems or information technology controlled devices with a Y2K problem. Testing can be accomplished at a government or non-government facility. In addition, the Commanding General of the Army's Operational Test and Evaluation Command (OPTEC) committed the command to helping the Army fix Y2K. Specifically, OPTEC will ensure Y2K compliance for new systems undergoing operational testing. For legacy systems and other systems in post development software support (PDSS), OPTEC will assist PEOs, PMs, and other materiel managers by providing them an opportunity to test for Y2K compliance during the operational test of a new system with which the legacy system must interface.

The Army Y2K management plan provides the Y2K compliance checklist which formally declares that a system is certified as Y2K compliant. The checklist contains specific guidance on determining that a system is thoroughly tested (to include the testing of all its interfaces), properly documented, and determined to be Y2K compliant. Government certification for all Acquisition Category (ACAT) systems or devices and those designated as critical in the Army Y2K data base or reported as critical to OMB is at the general officer or SES level.

Increasing Your Y2K Situational Awareness

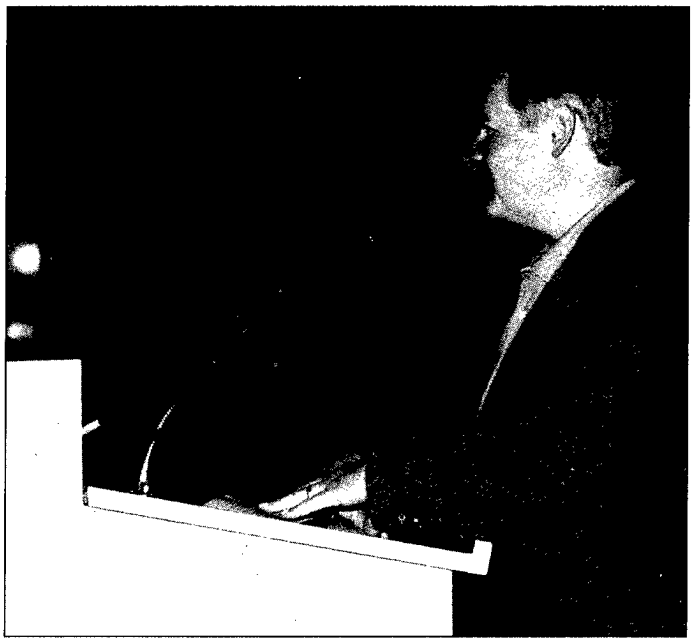
The most current and convenient way to stay informed of Y2K policies and information is to visit the web sites listed in the accompanying figure. The majority of the sites listed are government sites. The Army sites contain information on policy and plans, reporting procedures, and certification. The last three are nonprofit and/or private sector sites with information pertinent to Y2K in the government. Weekly trade newspapers, such as *Federal Computer Week, Government Computer News*, and *Washington Technology,* provide news on how the federal government is progressing on Y2K. National business publications, such as the *Wall Street Journal, Business Week*, and *CIO Magazine* generally focus on Y2K in the private sector.

Summary

The Army's ability to shoot, move, and communicate successfully depends on the effectiveness of its information systems and networks. The Year 2000 problem must not be allowed to pose any risk to the soldier, the civilian, or the American public. By working the five-phase Y2K resolution process, avoiding the pitfalls, and applying continuous executive emphasis and vigilance, Army managers can win the Y2K war.

MIRIAM F. BROWNING is the Director of Information Management in the Office of the Director of Information Systems for Command, Control, Communications and Computers. Appointed to the Senior Executive Service in 1988, she is responsible for the policy and oversight of the Army's information management/technology programs. Browning holds a B.A. degree in political science from Ohio State University and an M.S. degree in information technology from George Washington University. She is a graduate of the Federal Executive Institute, the Army War College, and the National and International Security Program at the John F. Kennedy School, Harvard University.

LTG Paul J. Kern speaks for the first time as Director, Acquisition Career Management.



Army Acquisition Executive Robert M. Walker welcomes workshop attendees.

Army Leadership, PEOs, PMs Meet in Orlando...

ACQUISITION WORKSHOP ADDRESSES LIFE CYCLE MANAGEMENT, OTHER KEY ISSUES

By Debbie Fischer
Army RD&A Staff Writer

Life Cycle Management was the theme of the 1997 Army Acquisition Workshop held in Orlando, FL, August 25-26. Attended by approximately 200 program executive officers (PEOs), program, project, and product managers (PMs), and other Army acquisition leaders, the workshop addressed issues such as bringing the acquisition and logistics communities closer together, digitization, and sustainment of weapons systems.

Preceding the workshop was a general officer and senior executive service summit on Army Acquisition Corps (AAC) issues and concerns. This included a welcome by Keith Charles, Deputy Director, Acquisition Career Management (DDACM); a briefing by MG David R. Gust, PEO, Intelligence, Electronic Warfare and Sensors, about his experience on the FY98 COL, PM and Acquisition Command Board; a briefing by COL Thomas V. Rosner Jr., Director of the Acquisition Career Management Office, Office of the Assistant Secretary of the Army (Research, Development and Acquisition) (ASA(RDA)); and informal discussion among the participants. The summit included discussion of best-qualified selections as a means for establishing professionalism in the AAC; utilizing the AAC Reserve Component; and increasing communication. Charles encouraged the participants to accept responsibility for the flow of information.

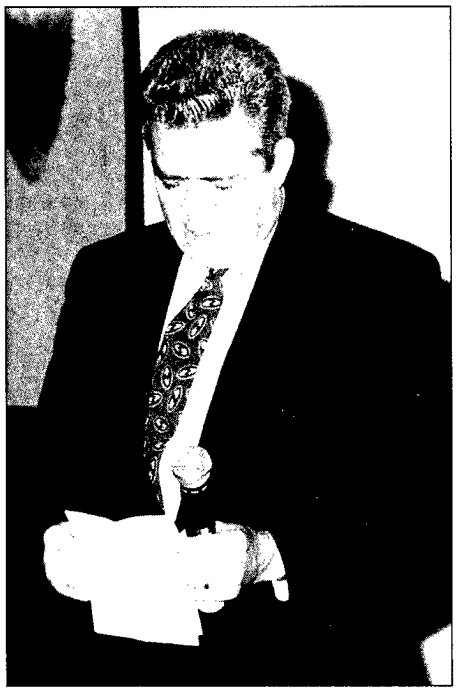
Dr. Kenneth J. Oscar, Acting ASA(RDA) opened the workshop by explaining the life cycle management theme. He said that the acquisition community is challenged with shifting from a front-end focus on acquisition and its costs to a total ownership focus, not just in weapons but in everything it buys. Oscar said that continuous modernization through spares and technology insertion throughout the life cycle will have to be accomplished within current resources. He also emphasized the importance of information management for tracking spare parts and operation and support (O&S) costs.

Army Acquisition Executive (AAE) and ASA (Installations, Logistics and Environment) Robert M. Walker welcomed the attendees, saying that he is honored to serve as the AAE with the very professional members of the AAC both at the conference and on their staffs. Dual-hatted in the acquisition and logistics fields, Walker believes that merging the acquisition and logistics communities will be possible, and that reducing sustainment costs is necessary. He emphasized the need for acquisition reforms in order to achieve our modernization goals.

LTG Paul J. Kern, who also serves as Military Deputy to the ASA(RDA) and Director, Army Acquisition Corps, spoke for the first time as Director, Acquisition Career Management. He addressed many elements of life cycle management such as resourcing a modernized Army within available resources and integrating sustainment into the acquisition business. Kern said that major challenges faced by the acquisition community include fielding the first digital division by the year 2000, reforming logistics without losing ground gained in acquisition reform, and modernization through spares to sustain weapons with very long projected lifetimes. Kern said that paperless acquisition can be a useful tool for management to gain information not only to create a better process, but a better product for the user as well.

Roy Willis, Acting Deputy Under Secretary of Defense (Logistics) described Office of the Secretary of Defense (OSD) initiatives in life cycle cost management. He said that downsizing/cost reductions cannot be made evenly across the board if the military is to maintain its capability. According to Willis, O&S – primarily mean time between failures (vs. fuel or ammo)—which drive logistics costs, must be cut more. Willis said that 21st century logistics challenges include weapon system life cycles of longer than 71 years, which, even modernized, will dominate O&S costs. More efficient information processing technology, commercial solutions, and planning ahead for component needs and availability are all factors in logistics cost reductions, he said. "Regardless of how good your system is, if you do not reduce costs you will not have a modern Army in the second decade of the 21st century," Willis added.

A presentation on digitization was provided by BG William L. Bond, Director of the Army Digitization Office. He said that the establishment of command and control communication has been basically successful. He added that digitization training is an area that requires more emphasis. Of course, digitizing a platform is a major task, so Bond urged the attendees to begin early and demonstrate the ability to integrate the system both horizontally and vertically.



Roy Willis, Acting Deputy Under Secretary of Defense (Logistics), describes OSD initiatives in life cycle cost management.

Additional Army digitization issues are man/machine interface and development of tactics and doctrine.

Ron Mlinarchik, Director, Acquisition Reform Reinvention Lab, OASARDA, provided an update on the Army Chief of Staff's Force XXI initiatives, which aim at reducing acquisition lead time to zero and accelerating fielding of items for the Army's first digitized division. Mlinarchik said that each Battle Lab initiative needs a "godfather," and should be adopted by an acquisition center, PM, deputy for systems acquisition, or weapon system manager. He noted that a definable, repeatable process has been developed for Force XXI initiatives and the challenges are to focus on execution of FY 97 Force XXI dollars and to begin now to identify FY 98 Warfighting Rapid Acquisition Program (WRAP) candidates leading to a WRAP Army Systems

BG William L. Bond, Director of the Army Digitization Office.

Acquisition Review Council early in calendar year 1998.

COL Elton D. Minney, Director for Acquisition Reform, Army Acquisition Reform Directorate, Office of the Deputy Assistant Secretary of the Army (Procurement), OASARDA, outlined OSD's strategic process to develop its focus for the year 2000. This includes a number of goals, each of which has a proponent and a baseline for measuring progress. These goals include greatly reducing time to deliver major Defense systems; using credit cards for micropurchases and reducing order-to-receive time; fostering partnership; achieving visibility of materiel assets; and decreasing paper transactions.

The first day of the conference closed with an informal presentation on the new officer evaluation report (OER) by LTC Ron Flom, Chief of the Materiel Acquisition Management Branch, U.S. Total Army Personnel Command. Flom said that officers are being given an opportunity to learn about the new system through six briefing teams deployed worldwide. He said that the OER system being replaced introduced the senior rater concept and the OER support form, and has served the Army well in many ways. Thus, the intent is to keep the best of the old system, incorporating only necessary changes. One goal is improving leader communication through the support form, to provide officers more formal guidance. This goal will be met through expanded distribution of the support form and documented follow-up counseling.

Keith Charles, who in addition to DDACM responsibilities serves as Army Deputy Assistant Secretary for Plans, Programs and Policy, described the program objective memorandum. Among the subjects he

Workshop panelists (left to right) Larry Hill, Maury Donnelly, Dale Adams, Keith Charles, MG James R. Snider, and BG Joseph Yakovac Jr.

A presentation on the Simulation, Training and Instrumentation Command was provided by its Commanding General, BG John Geis.

addressed were expected increases in RDA funding and future requirements related to the Army's digitization efforts.

COL Stephen G. Kee, PM, Apache Attack Helicopter, Office of the PEO, Aviation, discussed prime vendor support—a PM's approach to life cycle management, mentioning that one advantage to prime vendor support is accountability. He added that when spare parts are modified, it is a challenge to ensure that the system will continue to meet performance specifications, and that industry should be responsible for guaranteeing that it does. Kee also advocates using information technology to improve supply support.

A panel discussion moderated by Keith Charles followed. Other members were Dale Adams, Principal Deputy for Acquisition, Headquarters, Army Materiel Command; MG James R. Snider, PEO, Aviation; Maury Donnelly, Director for Investments, Office of the Assistant Secretary of the Army (Financial Management), Army Budget Office; BG Joseph Yakovac Jr., Deputy for Systems Acquisition, U.S. Army Tank-automotive and Armaments Command; and Larry Hill, Chief of the Integrated Logistics Support Branch, Office of the Deputy Chief of Staff for Logistics. Charles emphasized that responsibility for life cycle management requires control over funding, and that there are technical issues related to when, how and where a PM is able to influence the use of funds spent on his or her system.

Other issues raised by this open forum included contractor-supported organizations, application of the AR-5000 definition of life cycle costs, planning well ahead for sustaining costs and building these costs into a baseline, and whether major logistics decisions will be staffed through PMs.

Operational Test and Evaluation Command (OPTEC) Commanding General (CG) MG Larry G. Lehowicz outlined OPTEC PEO days, which facilitated frank discussions among members of the acquisition and test communities. Lehowicz stressed that the acquisition and test communities should understand and respect each other's missions, and test early and often with consistent evaluations. He added that test-community colonels now have the authority to release test data to PMs—an authority previously restricted to the CG, OPTEC.

A working lunch followed with an Army Acquisition Corps update by Mary Thomas, Deputy Director, ACMO, OASARDA; COL Thomas V. Rosner Jr.; and LTC Ron Flom. Thomas noted the importance of civilians broadening their experience after gaining expertise in their primary career field. She outlined the Corps Eligible (CE) Program for developing GS-13s, and the Competitive Development Group, a competitive opportunity open to all CEs and GS-13 AAC members, designed to provide enhanced training, leadership and career development opportunities in a centrally managed, individualized, three-year program. Thomas added that the central selection board process is being improved through the senior rater potential evaluation, making civilian files more comparable to military through the acquisition civilian record brief, and the development of an AAC Civilian Training, Education, and Development System to identify key experiences to make civilians competitive for key leadership positions.

Rosner addressed military issues, such as the transition to a single functional area and grooming the AAC reserve component for missions in program offices and contingency contracting. Rosner said that educational initiatives such as acquisition certification courses at the Command and General Staff College and the development of a master's program at Fort Leavenworth will save significant manyears and dollars. He concluded by asking the attendees to emphasize communication, and to see that their personnel receive necessary training.

COL Thomas V. Rosner Jr., Director of the Acquisition Career Management Office.

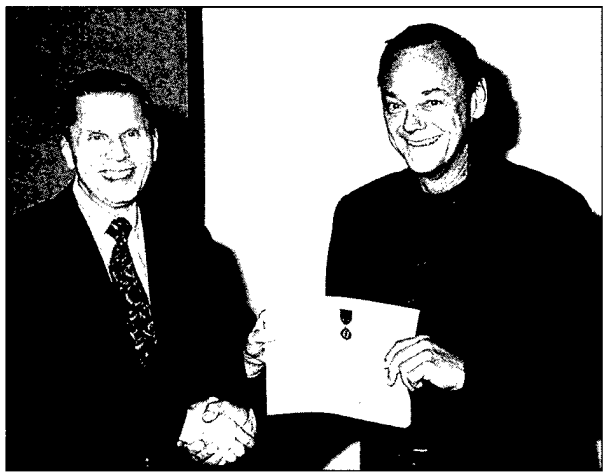
Flom provided an update on AAC officer personnel management. He said that downsizing the AAC by 186 officers had just been completed, but that he did not expect future AAC downsizing except as a part of the whole Army. Flom remarked that between an officer's first acquisition assignment and the time when they're first considered for PM or acquisition command, they have 11 to 13 years to gain experience, education and training that will make them competitive. Flom believes that officers should maximize that time to gain ***broad*** experience.

A presentation on the Simulation, Training and Instrumentation Command (STRICOM) was provided by its CG, BG John Geis, who said that STRICOM operates like a life cycle PEO. Geis added that there are a number of ways that STRICOM can support PMs, including consultation, developing training plans and concepts, and assisting the PM's contractor as part of a training team. He also said that STRICOM supports what it fields through worldwide competition for maintenance contracts, umbrella contracts, and programming for O&S costs.

A formal dinner with a speech by RADM George P. Nanos Jr., Navy Director of Strategic Systems, and awards presentations (see page 16) wrapped up the workshop. Introducing Nanos, Dr. Kenneth J. Oscar emphasized that Nanos is responsible for *all aspects of the research, development, production, logistics, storage, repair and operational support* for the Navy fleet's ballistic missile weapon systems. Nanos explained the pros and cons of using commercial off-the-shelf parts, which are less expensive and provide continually refreshed technology, but may present compatibility problems. He believes in an interdisciplinary team approach, and relies on privatization for life cycle support. Nanos also said that he incentivizes contractors for successes with reliability, accuracy, and low unit cost.

Judged by feedback from numerous attendees, the 1997 Army Acquisition Workshop was termed "a huge success."

Meritorious, PM Awards Cite Outstanding Achievements



Dr. Kenneth J. Oscar, left, presents a Meritorious Civilian Service Award to Keith Charles.

A special ceremony at the 1997 Army Acquisition Workshop included presentation of a Meritorious Civilian Service Award, two Project Manager of the Year Awards, and a Product Manager of the Year Award.

Meritorious Civilian Service Award

Keith Charles was honored with a Meritorious Civilian Service Award for his outstanding accomplishments during the period Jan. 1, 1996, through March 31, 1997, as Deputy Director for Acquisition Career Management in the Office of the Assistant Secretary of the Army (Research, Development and Acquisition).

Of Charles' many accomplishments, he was specifically cited for the implementation of the individual development plan process, creation of the Competitive Development Group Program, execution of a communication outreach effort, and establishment of a process action team to address reforms in the personnel management system for the Army Acquisition Workforce. As mentioned in the award citation, "Charles' devotion to the professionalism and competence of the Army Acquisition Workforce will positively impact Army modernization and readiness well into the 21st century."

Project Managers of the Year

COL James B. Cross and COL Stephen G. Kee each received a Project Manager of the Year Award.

Cross was recognized for his achievements as DOD PM, Mobile Electric Power (PM-MEP). (He is now Director of the Army Acquisition Executive Support Agency (AAESA), Fort Belvoir, VA.) The Office of the PM-MEP is responsible for total life cycle management of development, acquisition, standardization, logistics support, product improvement and fielding of mobile electric power generating sources within DOD. While PM-MEP, Cross managed and coordinated the activities of assets for all four Armed Services, through four separate Army and U.S. Air Force (USAF) procuring activities, eight distinct prime contractors, and a large, diverse multi-Service matrix support system.

The specific accomplishments outlined in Cross' nomination include the following: As a direct result of Cross' visionary financial management and personal efforts, he has vastly accelerated fielding by 12 years, and reduced future Army operations and maintenance costs, no trivial feat in the current fiscal environment. Furthermore, he developed a creative acquisition strategy to reduce power unit/plant integration costs by using small business commercial producers.

Cross' decentralized, open management style empowers his people, and supports integrated concept and product teams. Partnerships he has forged personally with industry and the Electrical Generating Systems Association resulted in establishment of new commercial standards for generator testing, and the first generator contract awarded in nearly 15 years ***without*** a protest. He worked tirelessly to improve relations with the Army, other Service matrix elements (especially USAF procurement activities at Sacramento Air Logistics Command) and contractors. Cross initiated a full-scale office automation upgrade, leading the PM-MEP Office into future electronic data management, including Internet-conferencing, white boarding, and automated management of technical drawings. Under Cross' direction, a 3-kilowatt Tactical Quiet Generator (TQG) Integrated Concept Team developed the first ever requirements documents based on flexible performance objectives and thresholds vice rigid requirements.

Cross ensured that all four competitive contracts issued in FY 96 were on a best value basis. In the test and evaluation arena, he eliminated mandatory use of archaic Gould strip recorders and implemented computer-controlled testing, established a fledgling "Virtual Prototyping" facility at Fort Belvoir, VA, to simulate design testing, increased testing in contractors' facilities, and reduced testing requirements in solicita-

Accepting the PM of the Year Award on behalf of COL James B. Cross, former PM-Mobile Electric Power (MEP), are Dale Adams (second from left), Principal Deputy for Acquisition, HQ AMC, and COL James Wells (third from left) current PM-MEP. Presenting the Award are Dr. Kenneth J. Oscar (far left) and LTG Paul J. Kern.

tions while minimizing test creep. He did not rest on previous laurels and successes, but laid out a challenging set of goals for improvement of the 5-10-15 kilowatt TQG solicitations in FY97–including use of electronic (CD-ROM) solicitations, reducing contract data requirements lists/contract line item numbers, limiting sizes of proposals, initiating on-site oral presentations, streamlining the source selection process, and using a 10-year requirements contract.

Finally, Cross identified major shortfalls in the way the Army allocates generators and convinced HQDA to establish a Red Team to redefine the process, achieving a potential cost savings of up to $250 million and improving reliability and maintainability.

COL Stephen G. Kee earned the PM award for his outstanding efforts as PM, Apache Attack Helicopter. The Office of the PM, Apache Attack Helicopter is part of the Program Executive Office, Aviation, which recently moved to Redstone Arsenal, AL. As PM, Kee plans, programs, and executes Apache's $600 million annual research, development, and production budget, and is responsible for the sustainment and product improvement of the AH-64 Apache. Kee is also responsible for an ACAT-1 Program to modify the AH-64A to AH-64D Apache Longbow configuration, and for testing, fielding, and sustaining the AH-64D Helicopter, fire control radar, and radar frequency interferometer. He also manages foreign military sales programs to six countries.

COL Kee's cited accomplishments are summarized as follows: Kee has employed major cost reduction initiatives in acquisition, operation, and support costs. The aircraft production rate was accelerated to a minimum of six per month via use of a multiyear contract for the AH-64 remanufacture program. This effort eliminated four years of fixed costs for both the contractor and the government.

Through efficient reorganization of functions and reliance on integrated product teams, Kee has been able to significantly reduce the requirement for Army Materiel Command matrix support, programmatic and technical support contractors, and travel expenses. While this was being accomplished, office productivity also increased.

LTG Paul J. Kern (right) presents a PM of the Year Award to COL Stephen G. Kee, PM, Apache Attack Helicopter.

Under Kee's direction, the Apache Attack Helicopter PM Office executed an acquisition strategy, the centerpiece of which was the implementation of a five-year multiyear procurement (MYP) contract with McDonnell Douglas Helicopter Systems. This MYP concept led DOD in many areas of acquisition streamlining and innovative contracting: performance-based payments, performance specifications, eliminating military specifications and standards that add no value while relying on industry standards, a sensible and enforceable warranty clause, and a fixed price contract with a savings incentive clause that will benefit both industry and the government. Kee's initiation of MYP contracts also resulted in significant cost avoidance by the government and increased performance.

Product Manager of the Year

The Product Manager of the Year Award went to LTC Bruce Jette, PM for the Aerial Common Sensor (ACS). The Program Executive Officer for Intelligence, Electronic Warfare and Sensors (IEW&S), MG David Gust, nominated Jette for this award from among the multitude of programs under his supervision. Both Gust and Jette acknowledge that, although this is an individual award, it also honors the outstanding support and dedication of a highly motivated staff of acquisition professionals in the PM, ACS Office.

The Office of the PM, ACS is part of the Program Management Office for Signals Warfare under the direction of Bill Hayden. As summarized in the award nomination, these offices lead the way in technology as a force multiplier while ensuring cost control through innovative thinking and acquisition streamlining principles. The Office of the PM, ACS leads the way in compliance with standards such as the Joint Airborne SIGINT Architecture (JASA). This will reduce costs and increase flexibility through modularity and scalability of systems. Compliance with JASA will also allow for evolutionary systems growth and cost savings through integration of new capabilities vs. wholesale redesign of systems.

The key to making ACS a viable product is the real time dissemination of current, viable intelligence to the battlefield commander and the ability to respond to field taskings with immediacy and accuracy. The intelligence will be part of and electronically linked to the other PEO IEW&S-developed sensors and analysis systems, presenting a complete situational awareness of the battlefield.

LTC Bruce Jette (center), Product Manager, Aerial Common Sensor, receives the Product Manager of the Year Award from Dr. Kenneth J. Oscar (left) and LTG Paul J. Kern (right).

MODERNIZATION THROUGH SPARES

By Lynn Mohler

Introduction

Today, new technology (the "technology revolution") affects all of our lives. From our car's electronic ignition system to digital television to the Internet, we are experiencing a continuation of the technology revolution. Similarly, our weapon systems are affected. This technology revolution, depicted in Figure 1, can be seen most clearly in the electronics industry. For example, the number of parts in a typical radar system has decreased by 50 percent in the last 10 years as a result of large integrated circuits. The revolution has resulted in increasingly frequent introduction of new technology but has also caused the unavailability of older technology. This is illustrated by the frequent introduction of new INTEL chips that make "older" PCs obsolete long before they wear out. The combined effect of increased commercial demand for integrated circuits and the decreased Defense demand has resulted in a shrinking military share of the market. Just 10 years ago, the Defense industry market share was 10 percent; today it is less than 1 percent.

The technology revolution impacts many elements of Defense weapon system management. Some technologies change so rapidly that system components are obsolete prior to entering production. Traditional configuration management approaches, based on top-to-bottom government control of weapon system configuration, are no longer feasible or desirable for many systems. Former Secretary of Defense William J. Perry's acquisition reform initiative and military specification reform objectives are to find solutions and implement them in new and existing programs. An example of Perry's intended outcome is the modernization through spares (MTS) concept using spares (sustainment) funds, not only to support and

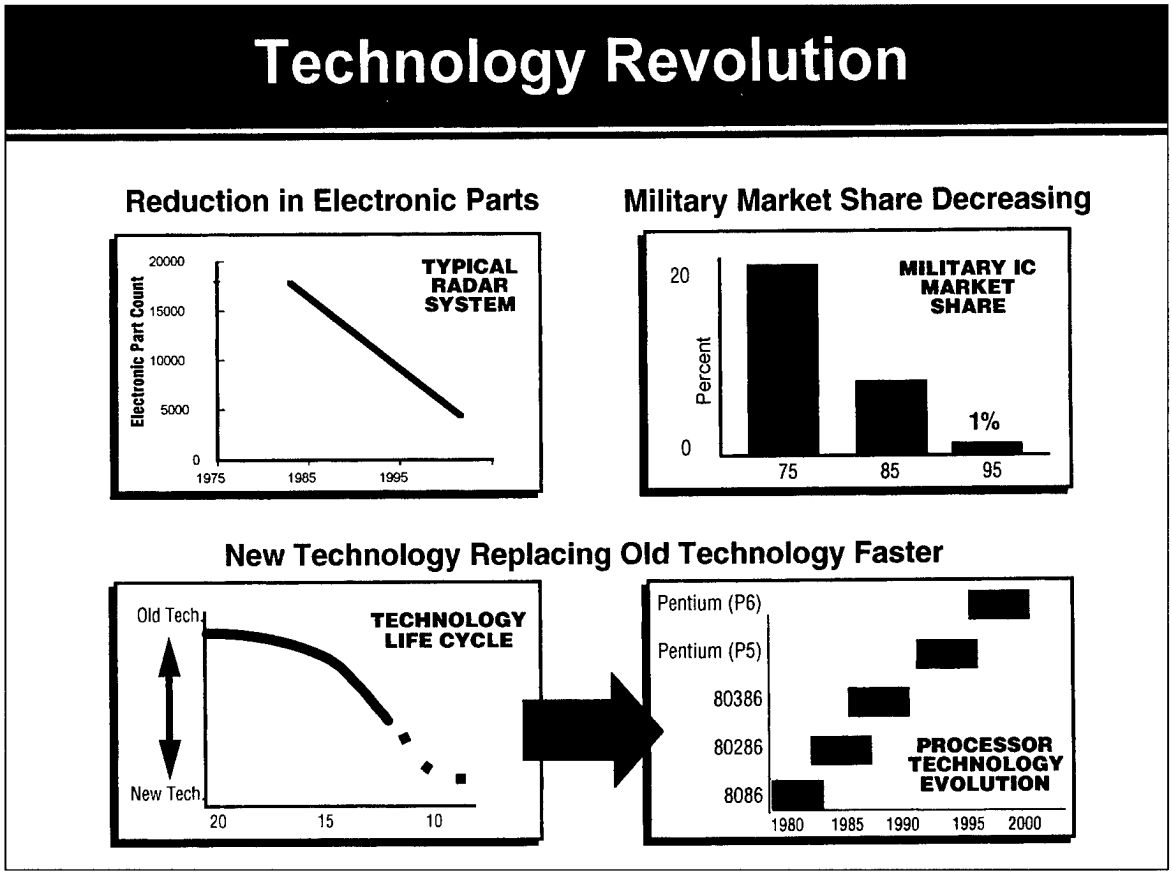


Figure 1.

maintain equipment, but to modernize equipment.

The way in which Defense programs have evolved in the past is not representative of how to manage programs today and in the future. Acquisition strategies must change and are changing. For example, military hardware systems must last longer while maintaining effectiveness. They have to last longer because of decreased new system procurements but, at the same time, the system inventory requirements remain nearly constant. The net result is increasingly older systems that are expected to meet new battlefield demands. However, experience shows that aging systems result in increased failure rates, more obsolescence and increasing maintenance costs as shown in Figure 2.

The Army's operating and support (O&S) budget offers a mechanism to improve this picture. The Army's annual spares procurement budget represents approximately 10 percent of the total Army O&S budget. The objective of MTS is to leverage the spares procurement budget to help achieve the modernization objectives of Army XXI with technologically advanced, more reliable weapon systems at lower support costs.

Performance-Based Requirements

A first step is the use of performance-based requirements which encourages design innovation and commercial manufacturing processes. These provide the opportunity to optimize industry and government technical and manufacturing capabilities at lower cost. Military specification reform, based on performance requirements statements (not "how to" statements), provides the mechanism to achieve force modernization. This opportunity applies to both new system and spares procurements for existing systems.

Seizing this opportunity is the concept behind the MTS initiative with the belief that using performance specifications in spares procurements will encourage technology insertion and commercial processes. The intended result is lower maintenance costs, increased battlefield capabilities and an expanded Defense industrial base. The Army has made excellent progress in applying acquisition reform initiatives to major Acquisition Category (ACAT) programs and has taken the lead to apply acquisition reform to end item reprocurements and spares procurements. However, its application is limited by continued use of detailed design packages to describe system performance requirements.

MTS requires reconsideration of basic elements of the program's acquisition strategy. One element is the government's strategy regarding maintenance and sparing levels. The sparing level, primarily developed by maintenance planning, must be re-evaluated based on acquisition reform concepts. A decision to change to performance-based specifications must make good business sense, and must include review of a program's strategy. All Army weapon systems have their own support plan consistent with logistic requirements. Provisioning is one element of the support plan.

Typically, programs include various levels of sparing, a continuum from piece parts to major subsystems. This broad continuum must be examined as depicted in Figure 3. Program managers must reconsider their basic acquisition strategy elements such as:

- The point in the spares continuum at which government configuration management will be applied.
- The use of contractor maintenance support.

These considerations must receive program manager attention and must be based on a "business decision."

So, what acquisition strategies must be reconsidered for existing programs? What

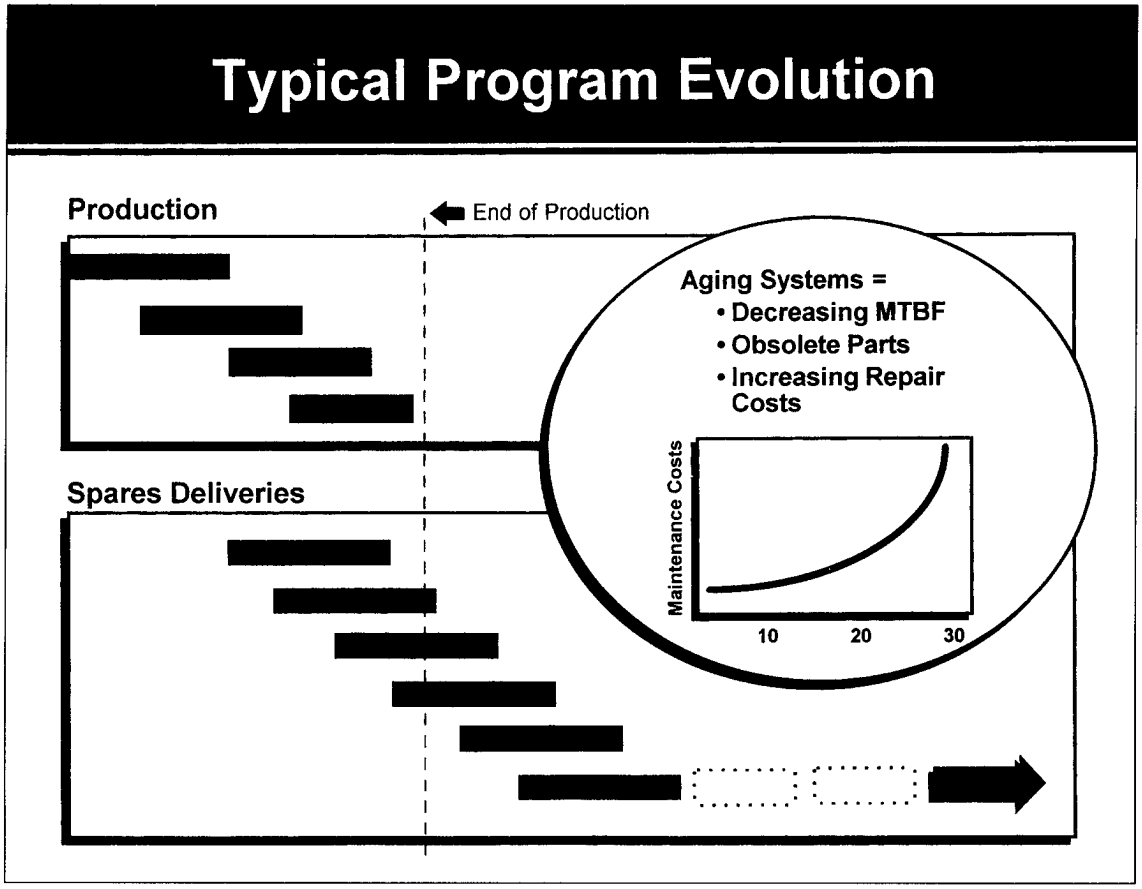


Figure 2.

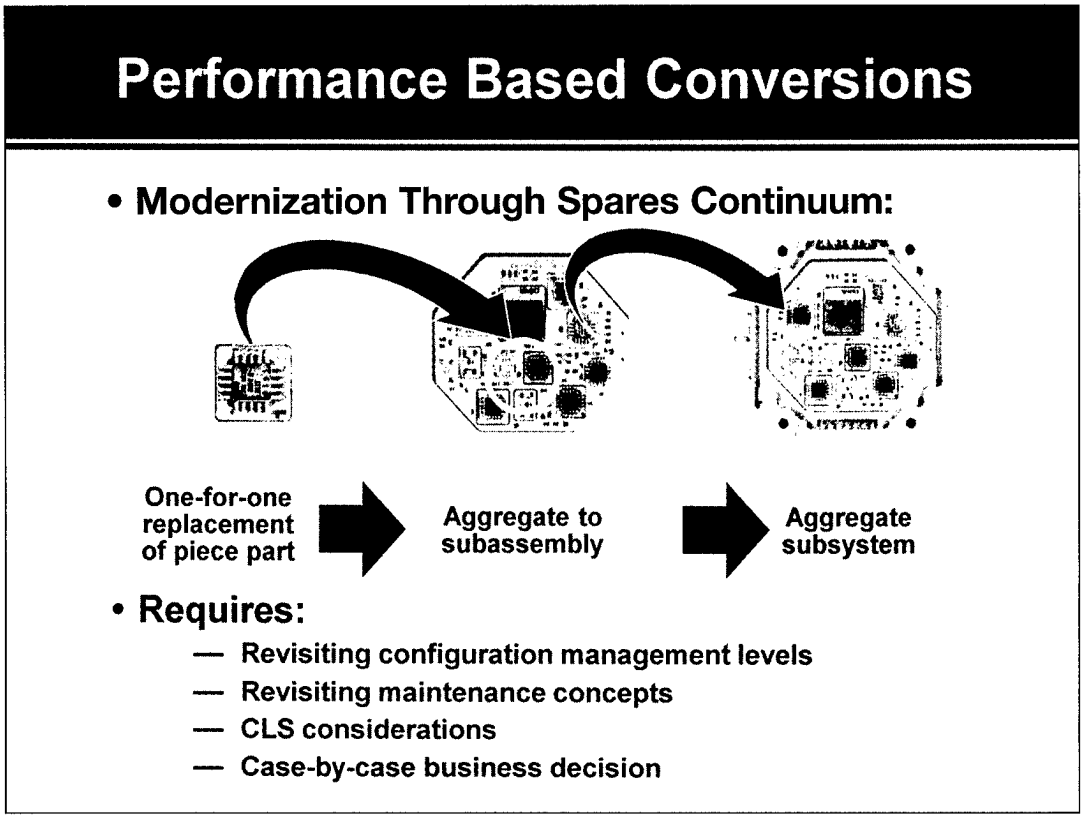


Figure 3.

acquisition issues must we focus on to achieve modernization by leveraging spares procurements? To help answer these questions, an MTS conference and workshop was hosted by the U.S. Army Missile Command (MICOM) (now the U.S. Army Aviation and Missile Command) in Huntsville, AL, May 28-29, 1997. The conference brought together personnel from DA staff, Army program managers, Army Materiel Command (AMC) personnel and other DOD Services to address the reality that the Army cannot achieve superiority solely by development and procurement of new weapon systems, but must also think "MODERNIZATION." This is a way of achieving a modern and superior warfighting capability by providing new technologies through spares procurements. Dr. Kenneth Oscar, Acting Assistant Secretary of the Army for Research, Development and Acquisition, and Dale Adams, Principal Deputy for Acquisition, AMC, gave the keynote addresses, which covered the fiscal and technology environment faced by the Army. They challenged the audience to explore acquisition initiatives and strategies; to share ideas and generate new ideas; and expand the MTS concept by identifying a comprehensive approach which can be implemented in all Army spares procurements. The goal of the conference and the workshop was to prepare action plans to support implementation and to develop templates that will facilitate the process of leveraging spares procurements to achieve Army modernization objectives. Following the plenary session, conference attendees were divided into 10 workshops, each addressing an acquisition initiative. The objective of the workshops was to expand the boundaries of understanding of how these initiatives could contribute to modernization and to implementation strategies. A brief discussion of each workshop follows:

Acquisition Initiatives/Incentives. This workshop addressed a broad spectrum of acquisition strategy areas including ongoing Army initiatives such as contract bundling and the "break back" effect caused by potentially fewer lower system level spares procurements. The participants reviewed acquisition strategies used by several programs to modernize systems and obtain greater capabilities at lower cost with a focus on applying these strategies to spares procurements. These examples demonstrated how application of innovative acquisition strategies can benefit existing programs. For instance, the ARC-210 radio program, installed in Army and Navy helicopters, is now procured at a 20 percent reduced unit price with a 120 percent mean-time-between-failures improvement.

Commercialization. The workshop explored methods to expand the Defense industrial base by using market research practices in spares procurements. Commercial items from parts to subassemblies, encouraged by use of performance specifications, were identified as a method to facilitate expansion of the Defense industrial base into the commercial base. For example, the Joint Surveillance Target Attack Radar System and Comanche programs have achieved large savings by incorporating commercial electronic components into their designs.

Technology Insertion. Incorporating new technology into existing programs is a method which can result in increased capabilities achieved at lower cost. The workshop explored use of horizontal and vertical technology insertion approaches for spares procurements. The High Density Module Technology developed in the PAC-2 Low Voltage Power Supply, which doubled its reliability and reduced the 10-year life cycle cost by $10 million,

was reviewed for application to generic spares procurements.

VE/OSCR/PBD 714. Three Army acquisition reform initiatives offer opportunities to meet MTS objectives. Value engineering (VE) continues to provide contractor and government sharing of cost savings for improvements to system design and manufacturing processes. The Operations and Support Cost Reduction (OSCR) Program provides upfront funding for approved component redesign, re-engineering and conversion to performance specifications. An example is the Abrams Program's proposed track system improvement which would significantly extend the track life. The existing track system relies on rubber materials which are susceptible to wear. The proposed system would substitute alternate materials which would extend track life while retaining vehicle speed and maneuverability. The Army is considering this improvement as a candidate VE or OSCR Program. PBD 714, a Center of Excellence depot level effort to upgrade reliability, maintainability and supportability of assigned systems, based on customer feedback and technology advances, is another initiative potentially beneficial to MTS. The workshop evaluated these existing programs, which already strive toward achieving MTS objectives, for more efficient application.

Parts Obsolescence. The technology revolution, discussed earlier, provides opportunities to enhance existing systems capabilities and to reduce support costs. The impact of this rapid technology change is usually first observed in the inability to procure electronic components due to their unavailability in the marketplace. For example, electronic component manufacturers discontinue production of old technology components when more capable components complete development and are produced for the commercial market place. Parts obsolescence is most frequently encountered during later years of weapon system production and out-of-production spares procurements. When the obsolete parts can no longer be obtained, replacement parts must be procured. Often it is necessary or preferable to redesign the assembly or subsystem to accept the replacement part. This workshop considered the relationship between system redesign due to parts obsolescence and MTS. Processes and templates to assist design engineers and managers were also discussed.

Sustainment Strategy. This workshop explored the relationship of MTS to a broad spectrum of life cycle cost reduction opportunities, particularly the need to re-evaluate maintenance and logistics management strategies. The role of the program manager in life cycle cost reduction was highlighted as critical to success and must be emphasized.

Specification and Standards Reform. Performance-based specifications, the cornerstone of military specification reform, is another avenue for achieving modernization. The AN/PPS-5 Ground Surveillance Radar was cited as an example of a performance-based upgrade program that gives an investment pay back of 2.2 years to achieve extended service, superior performance and reduced life cycle cost. Similarly, performance-based specifications in spares procurements offer the opportunity to incorporate new technologies. The workshop objective was to evaluate system engineering and management processes which must be considered when modernizing weapon systems. The participants examined military specification conversion processes and how the processes relate to optimizing configuration management and provisioning levels. They also identified how system engineering "requirements flow down" must be considered when modernizing weapon systems including changing government/contractor risk relationships when performance-based specifications are used. The workshop considered how risks are affected when systems are modernized using performance based procurements.

Technical Data Package Strategies. Today, most spares procurements use detailed design packages to define required performance; however, their use for spares procurements limits the ability to incorporate new technologies into weapon systems. The workshop explored the barriers to reducing reliance on detailed design packages and reviewed computer based, cost/benefit analysis tools which can support decisions regarding conversion to performance-based spares procurements. A MICOM-developed computer model and results of successful conversion of the TOW and Superdragon technical design package to performance specifications were examined.

Design Criteria/Systems Engineering. System designs often limit the ability to incorporate new technology. This workshop considered system engineering processes that can help meet MTS objectives. Design criteria, identified during early system design and development, is a basic element of systems engineering and establishes system design guidelines and architectures. The need to modernize systems places importance on ensuring that design criteria provides broad opportunity to incorporate new technology. For example, use of reprogrammable memory chips and modular replacement techniques can provide greater opportunities to improve future performance at lower cost. The workshop also looked at open system architecture concepts and other design engineering processes which can facilitate MTS.

Cost as an Independent Variable (CAIV). CAIV provides a process to tradeoff cost and performance for new designs, as well as modernization efforts. Nonrecurring costs associated with development of modernization changes must be compared to the benefits associated with modernization. In some cases, system design changes are unavoidable due to parts obsolescence. In other cases, modernization may offer improved capability as a result of new technology. In either event, costs and benefits must be compared. This workshop examined the role of the Integrated Process Team (IPT) in conducting tradeoffs and reviewed the role of ownership simulation models.

Conclusion

The workshops produced a great outpouring of ideas and recommendations about instituting the MTS concept. There was consensus by the majority of workshops on some salient recommendations such as the need to maintain a core of technical competency because AMC "cannot take advantage of what is not understood." Other recommendations cited the need to continue the challenge of statutes, FARS, and policy that are unintended barriers to implementing MTS. As a result, an overarching integrated product team (OIPT) was formed and met in July 1997 to review the outcome of the MTS workshops and provide recommendations to formalize the process in the Army. The OIPT will also assist major subordinate commands, program executive offices and PMs to implement the process and ensure continued management support to make MTS part of the Army culture. Additional information about MTS can be obtained at: http://ippd.redstone.army.mil/io/mts_pro.htm.

LYNN MOHLER is the Standardization Officer for the Army in the Office of Deputy Chief of Staff for Research, Development and Acquisition, Headquarters, Army Materiel Command, Alexandria, VA. He holds a mathematics degree from Juniata College, and has done postgraduate studies at the University of Delaware. Mohler served on the Defense Management Review Working Group, which was the forerunner of the Blue Print for Change, and is currently leading the Army's implementation of the military specifications and standards reform initiative.

DEVELOPING BLOOD PRODUCTS FOR COMBAT CASUALTY CARE

By COL John R. Hess, MC

Introduction

The U.S. Army has been the world's most important developer of blood products. This involvement started when CPT (later MAJ) Oswald Robertson built the world's first blood bank during World War I, collecting universal donor blood in bottles of citrate and sugar solution, storing them on ice for as long as 26 days, and demonstrating their life-saving ability as resuscitation solutions in wounded Canadian soldiers at the Battle of Cambrai in November of 1917.

In World War II, the Army worked with the Navy and the National Research Council to develop freeze-dried plasma, albumin, gamma globulin, fibrin foam, and a worldwide blood distribution system. CPT (later MG) Douglas Kendrick, who oversaw and wrote about this work, is viewed by many as the father of the American blood bank system.

During the Korean War, the Army helped develop plastic blood bags and the CPD (Citrate, Phosphate, Dextrose) anticoagulant system. The Army's Surgical Research Team, led by LTC (later COL) William Crosby, defined the safety and efficacy of massive transfusion. During the Vietnam War, LTC (later COL) Charles Shields, at Fort Knox, developed the five-week red blood cell storage solution, CPDA-1, and COL Frank Camp worked to standardize blood typing reagents. The Army continues this tradition with the development this decade of the dry fibrin sealant bandage and eight-week red blood cell storage.

These products were all developed to meet the needs of soldiers on the battlefield. Before the Army developed improved blood systems, others struggled with direct person-to-person transfusions, glass bottles, home-made typing sera, and short storage times. Failures of the more primitive blood transfusion systems and the resulting deaths were accepted as compatible with the state of the art. Functionality on the battlefield required more robust and durable systems, and civilians have taken the improved Army systems and made them national standards. This dual use potential and validation of blood systems makes them an exciting area of research, development, and acquisition.

The Need For New Blood Products In The 1990s

The decade of the 1990s started with the Persian Gulf War, where 82,000 units of packed red blood cells were sent to Saudi Arabia. Of those, 1,000 units were used to treat casualties (250 units to U.S. and 750 units to Iraqi), 6,000 units with several weeks of storage life were returned to CONUS, and another 8,000 units close to expiration were given to the Romanians. The remainder outdated in theater and were destroyed. Clearly, improving the duration of storage of liquid stored red blood cells would increase the efficiency of providing blood in remote areas.

A frozen blood system, developed by the Navy, was tested in the Gulf on one of their hospital ships where 265 units were thawed, the glycerol cryoprotectant washed away, and the cells repackaged. None of the thawed units was used. The system proved to be in combat what it is in civilian life: time-consuming, expensive, lacking in quality control, and ultimately unnecessary.

Of the 250 units of red blood cells and whole blood used to treat American casualties, 52 units went into a single soldier with a pelvic wound. Repeated attempts to control his bleeding by an excellent team of surgeons using state-of-the-art methods failed. Better systems to stop surgical bleeding were needed.

These simple lessons from the few hundred casualties of the Gulf War were consistent with the published experience in past wars and at variance with the Army's then major blood research goal, producing a blood substitute. The blood substitute was supposed to save lives by allowing resuscitation with an oxygen carrying solution to be used far forward on the battlefield. However, laboratory experience with the prototype materials suggested that they would be toxic, short-lived in the body, and hard-to-handle on the battlefield. At the same time, laboratory models of free bleeding showed that bigger holes bled faster and suggested that the benefits of attempting resuscitation before surgeons controlled hemorrhage were modest at best and in some circumstances counterproductive. It seemed best to concentrate on improving hemorrhage control and providing blood to refill the vascular space.

The Dry Fibrin Sealant Bandage

The dry fibrin sealant bandage is an attempt to provide something better for hemorrhage control. It is a dry mixture of the last two proteins in the human blood coagulation cascade, thrombin and fibrinogen, on an absorbable backing. Thrombin is an enzyme that converts fibrinogen to fibrin monomer. The more thrombin present, the faster the reaction goes. Fibrin monomer self-assembles to form fibrin polymer, the structural protein of blood clot. The more fibrinogen present, the stronger the clot. When

blood touches and dissolves the dry proteins, very high local concentrations of enzyme and substrate are formed. The reaction proceeds quickly, reducing the bleeding time from minutes to seconds.

But just because you can speed the reaction does not necessarily mean that you have done anything useful to help a bleeding individual. Early on, we demonstrated that a prototype of the dry fibrin sealant bandage could work to control hemorrhage from half-inch linear lacerations in widely exposed femoral arteries (the big artery into your leg, the pulse you feel in your groin). Holding the bandage in place for one minute stopped all bleeding, reduced blood loss by 85 percent, and prevented shock. But the question remained, could the device work in the complex geometry of traumatic wounds.

With the help of colleagues from the Plasma Derivatives Group of the Holland Laboratory of the American Red Cross, we made better prototype bandages and tested them in a model of ballistic injury. In deep, "blow-out" thigh wounds that shattered the femur and cut all major vessels, the bandage stopped bleeding in two minutes, reduced blood loss by two-thirds and prevented shock. The bandage not only could work in special situations, it would work in common ones.

With that information, the Army contracted the Red Cross to continue developing prototypes of the bandage and to find industrial partners to manufacture the bandage and guide it through clinical testing and FDA licensure. Army groups remain active in the work, testing the prototype bandages in a variety of models. LTC John Holcomb, MC, of William Beaumont Army Medical Center showed that the bandage can convert a common form of traumatic liver injury now associated with 26 percent survival in trauma centers into a completely survivable injury. LTC Rhonda Cornum, MC, of Brook Army Medical Center is using the prototype bandages to show that blood loss from impotency-preventing prostate cancer surgery can be greatly reduced. However, all of us associated with the project believe that the most important use of the bandage will be by medics on the battlefield and in civilian prehospital situations, insuring that wounded soldiers and injured civilians get to the hospital with more of their own blood in them.

Blood Storage

We all give blood with the expectation that it will be used, and thus, it is reassuring to know that 93 percent of all the blood donated in the United States finds a recipient. In centralized and well-organized places like Army medical centers, this increases to over 99 percent, but at the end of the supply chain in Bosnia, 1,700 units had to be prepositioned across Eastern Europe to ensure that the first 15 units needed were there when the time came. Most of the rest of the units expired or were given to locals as they were about to expire. The logistic costs of that blood and movement associated with that prepositioning could be greatly reduced if the shelf-life of blood were longer.

Modern blood storage systems, as you may remember from the last time you donated, are a set of interconnected plastic bags, some of which are filled with solutions. Blood is drawn into the primary collection bag containing the anticoagulant, the red cells are sedimented, the plasma and platelets drawn off, and an additive solution of red blood cell nutrients is added to make packed red blood cells. The basic question is what can you put in the additive solution to make the cells last longer. By the way, whatever it is you put in has to be so safe that 4 million people a year can take it in large quantities with no problems.

And how do you know if it works? Luckily, the FDA has set a rule that less than 1 percent of the cells can break down in the bag and three-quarters of cells must survive for 24 hours when put into the recipient. To measure this in the laboratory, we draw cells and store them in the experimental additive. At the end of the storage period, some are labelled with radioactive tracers and injected back into the original donor. This is a time-consuming procedure but the only one which provides useful information. There is a high priority on making shrewd guesses about which experiments are worth doing.

A careful reading of 40 years of blood storage studies suggested that the answer lay with either swelling the cells or increasing the pH. We at Walter Reed Army Institute of Research were in a position to test the idea of swelling the cells and arranged for a contractor to test increasing the pH. The contractor's methods worked and the Army now has rights to a very robust red blood cell storage solution that will store cells for eight weeks. The solution contains nothing that is not already in licensed blood storage solutions and is fully compatible with current techniques and usage. The cost of the contract was $200,000, and it will save the country at least $50 million a year for just the blood it saves and more in saved transportation costs. Moreover, the data suggests that we can store blood for even longer.

Force XXI Blood Products

There are other products that medical planners would like to have to further reduce the blood program's footprint on the battlefield. A red blood cell substitute has been high on medical planners' "want" list for decades, but their safety and effectiveness remain to be proven and any further development of these products is now in commercial hands. Replacing fresh frozen plasma with a freeze-dried product would reduce weight and eliminate a requirement for deep freezers in blood depots. Surgeons frequently request blood platelets to help control bleeding, but their present short five-day shelf life and critical storage-temperature requirements makes them almost impossible to deliver forward of field hospitals. Better platelet storage, a platelet substitute, or a quicker way to fully test freshly drawn whole blood from donors on the battlefield might solve this problem. Fresh whole blood is the present doctrinal alternative to platelets and is often preferred by experienced surgeons, so rapid blood-safety tests using a dry card-based format and a few drops of blood are very attractive for the forward surgical and special operations environments.

Conclusion

Ideal medical products for the battlefield should be safe and effective, light and cheap, low maintenance, compatible with long storage, and universally applicable. As a matter of DOD policy, they must be FDA licensed. Blood is highly effective, relatively inexpensive as a product, and quite safe, but the costs in terms of manpower and resources to maintain and correctly use blood on the battlefield are significant. Additionally, the knowledge required to make a national or theater blood system work is not trivial and requires a major commitment of resources by America's Army to continuously provide thoughtful management by experts in blood banking and transfusion medicine.

COL JOHN R. HESS, MC, is commander of the Blood Research Detachment, Walter Reed Army Institute of Research, Washington, DC. In this capacity, he is head of the Army's Blood Product Development Program. Additionally, he served as the last commander of the Letterman Army Institute of Research. He received his M.D. from the University of Washington and holds a master's in public health degree from the University of Hawaii.

LONG-TERM TRAINING, PART-TIME TRAINING, AND EXECUTIVE SEMINARS

By J. M. Welsh

The Deputy Director for Acquisition Career Management, in the Office of the Assistant Secretary of the Army (Research, Development and Acquisition) (OASA(RD&A)), is pleased to announce that 28 members of the Army Acquisition Corps (AAC) have been selected to attend long-term training, part-time training, and executive seminar programs. These courses began in July 1997. An alphabetical listing of those members selected—under the programs they were chosen for—is shown below. Each name is followed by the individual's organization, acquisition career field (ACF), and ACF code.

Senior Service College (SSC) Fellowship Program at the Industrial College of the Armed Forces (ICAF), Fort Lesley J. McNair, Washington, DC

Michael L. Alberelli, Office of the Program Executive Officer, Command, Control and Communications Systems, Fort Monmouth, NJ. ACF: Engineering (S).

David J. Atherton, Office of the Assistant Secretary of the Army (Financial Management and Comptroller), Pentagon. ACF: Comptroller (K).

Elizabeth K. Brock, U.S. Army Communications-Electronics Command, Fort Monmouth, NJ. ACF: Comptroller (K).

Gordon L. Campbell, U.S. Army Logistics Management College, Fort Lee, VA. ACF: Contracting (C).

Rosemary M. Carpenter, OASA(RD&A), Pentagon. ACF: Program Management (A).

Eugene J. DelCoco, Office of the Program Executive Officer, Ground Combat Support Systems, Picatinny Arsenal, NJ. ACF: Program Management (A).

Gregory Doyle, U.S. Army Medical Research Acquisition Activity, Fort Detrick, MD. ACF: Contracting (C).

Gene D. Duncan, Headquarters, U.S. Army Materiel Command, Alexandria, VA. ACF: Engineering (S).

Martha E. Gabriel, Office of the Program Executive Officer, Intelligence, Electronic Warfare and Sensors, Pentagon. ACF: Program Management (A).

James J. King, OASA(RD&A), Pentagon. ACF: Comptroller (K).

Setsuko McGinnis, Office of the Assistant Secretary of the Army (Financial Management and Comptroller), Pentagon. ACF: Comptroller (K).

Senior Service College (SSC) Fellowship Program at the Center for Professional Development and Training (CPDT), the University of Texas at Austin

Yolanda E. Hodge, U.S. Army Operational Test and Evaluation Command, Alexandria, VA. ACF: Comptroller (K).

James R. Hunt, Program Management Office, Signals Warfare, Office of the Program Executive Officer, Intelligence, Electronic Warfare and Sensors, Fort Monmouth, NJ. ACF: Engineering (S).

Betsy J. McChesney, Project Manager Office, Crusader, Office of the Program Executive Officer, Ground Combat and Support Systems, Picatinny Arsenal, NJ. ACF: Program Management (A).

Theresa R. Miller, U.S. Army Research Laboratory, U.S. Army Materiel Command, Adelphi, MD. ACF: Acquisition Logistics (L).

U.S. Naval Postgraduate School (NPS), Monterey, CA

Thomas L. Poteet, Office of Technical Director, U.S. Army Electronic Research, Development and Engineering Center, Aberdeen Proving Ground, MD. ACF: Engineering (S).

Robin E. Whitworth, Office of the Project Manager, Unmanned Ground Vehicles, U.S. Army Missile Command, Redstone Arsenal, AL. ACF: Engineering (S).

School of Choice at the Florida Institute of Technology

David E. Fieltsch, U.S. Army Communications-Electronics Command, Fort Monmouth, NJ. ACF: Contracting (C).

School of Choice at the University of Texas at San Antonio

Melissa Pittard, OASA(RD&A), Pentagon. ACF: Acquisition Logistics (L).

School of Choice at the University of Alabama at Huntsville

Debra Wymer, U.S. Army Space and Strategic Defense Command, Huntsville, AL. ACF: Engineering (S).

Part-Time Training at the IC2 Center for Commercialization and Enterprise, the University of Texas at Austin, Fort Belvoir Campus, Fort Belvoir, VA

Edward S. Cameron, Office of the Program Executive Officer, Intelligence, Electronic Warfare and Sensors, Fort Monmouth, NJ. ACF: Program Management (A).

Part-Time Training at the University of Pennsylvania at Philadelphia

Cheryl L. Maggio, Office of the Program Manager, Chemical Demilitarization, Aberdeen Proving Ground, MD. ACF: Program Management (A).

Senior Executive Fellows Program at the John F. Kennedy School of Government, Harvard University, Cambridge, MA

Carl A. Beaulieu, U.S. Army Armament Research, Development and Engineering Center, Picatinny Arsenal, NJ. ACF: Engineering (S).

Russell F. Fiscella, Chief, Engineering Division, Benet Laboratories, U.S. Army Armament Research, Development and Engineering Center, Watervliet, NY. ACF: Engineering (S).

Joseph A. Gormley, Project Management Office, Sense and Destroy Armor, Office of the Program Executive Officer, Ground Combat and Support Systems, Picatinny Arsenal, NJ. ACF: Program Management (A).

Weapon Systems Management Course, Ottobrunn, Germany

Denise E. Jones, Engineering Division, NATO Medium Extended Air Defense System Management Agency, U.S. Army Missile Command, Redstone Arsenal, AL. ACF: Engineering (S).

Fred Steinberg, Project Management Office, Tank Main Armament Systems, Office of the Program Executive Officer, Ground Combat and Support Systems, Picatinny Arsenal, NJ. ACF: Program Management (A).

Course Descriptions

• **The SSC Fellowship Program.** This program allows applicants to attend any of the National Defense University's colleges and institutions of higher learning. ICAF is the premier college for Acquisition Corps members selected for the SSC Fellowship Program. Held at Fort Lesley J. McNair in the heart of the nation's capital, the ICAF represents the culmination of acquisition career development, with its Senior Acquisition Education Program, and the Senior Acquisition Course, Acquisition 401. The Senior Acquisition Course consists of the entire 10-month ICAF curriculum, enhanced for designated acquisition students through four major elements: core curriculum, mandatory acquisition policy, advanced studies, and research. The Army has 10 civilian seats at ICAF, with seven of the 10 seats reserved for members of the AAC in grades GS-14/15.

In addition to the ICAF, the AAC offers an equally outstanding SSC Fellowship Program at the Center for Professional Development and Training (CPDT) at the University of Texas at Austin. Like its ICAF counterpart, the CPDT offers an intensive 10-month curriculum where fellows pursue a resident program in affiliation with the Army War College. This is a structured program with a trilateral academic focus on the relationships between national security policy and process, emerging critical technologies, and the industrial base. Completion of this program results in SSC credit, i.e., Military Education Level 1 (MEL-1) accreditation. The SSC Fellowship Program is only one of a host of education and training programs offered and funded by the AAC for members of the Acquisition Corps and Workforce.

Other Long-Term Training Programs

• **Naval Postgraduate School (NPS), Monterey, CA.** NPS offers two distinct graduate programs leading to master of science degrees in management. The acquisition and contract management curriculum is an interdisciplinary program, which integrates mathematics, accounting, economics, finance, behavioral science, management theory, operations/systems analysis, and specific courses in acquisition and contracting. This curriculum is designed to provide officers and civilians with the skills to serve effectively in hardware systems buying offices, field contracting offices, contract administration offices, and contract policy offices.

The systems acquisition management curriculum is also an interdisciplinary program designed to integrate business principles, management theory, operations/systems analysis, and engineering applications. The courses in this curriculum present the structure of acquisition management, the decisions and problems facing the Defense acquisition manager, the various forces at work within industry and government, and the impact of acquisition policies and strategies. These programs are 18 months long and are intended for AAC members in grades GS-14/15.

• **Master of Business Administration Program, the University of Texas at Austin.** This is among the most rigorous and prestigious business programs in the nation. Since the University of Texas is in the forefront of technology exploration and development, and maintains broad perspectives in emerging technologies, students will remain in the mainstream of Defense-related scientific and technical activities during their academic pursuits.

• **Master of Business Administration with Concentration in Management of Technology Program, the University of Texas at San Antonio.** This program provides students, primarily with a nontechnical background, the opportunity to study business administration while developing special expertise in the management of technology. This program is offered to members of the AAC in grades GS-14/15.

• **Master of Business Administration with Concentration in Information Systems, University of Texas at San Antonio.** This program provides students with the opportunity to study business administration while developing special expertise in information systems. This program is offered to members of the AAC in grades GS-14/15.

• **The School of Choice Program.** This program provides the opportunity for AAC members in grades GS-14/15 to attend long-term training on a full-time basis at an accredited college or university of their choice. The length of the program varies depending on the individual school and curriculum. However, AAC funding is provided only for the last 12 months, resulting in a graduate degree.

Part-Time Training

Part-time training permits AAC members the opportunity to pursue advanced education in conjunction with their careers.

• **The IC2 Center for Commercialization and Enterprise, the University of Texas at Austin, Fort Belvoir Campus, Fort Belvoir, VA.** The Fort Belvoir Campus of the Defense Systems Management College (DSMC) offers an excellent and challenging program leading to a master's degree in science technology and commercialization. It is a 12-month program and classes meet biweekly on Friday and Saturday. The program offers the working professional the opportunity to develop new skills in the

management of rapid technology transfer and commercialization. Only AAC members in grades GS-14/15 who reside in the northeast corridor of the United States may apply for this course.

• **University of Pennsylvania at Philadelphia.** This program offers an executive master of science degree in engineering. Classes are held annually in the Penn Tower Hotel on the university campus on alternate two-day weekends (Friday and Saturday) from September through May. This program is dedicated to training engineers and scientists for leadership roles in the management of technology-based organizations. This program consists of advanced technology courses that focus on fundamental and emerging technologies. Only AAC members in grades GS-14/15 who reside in the northeast corridor of the United States may apply for this course.

Executive Seminars

• **The John F. Kennedy School of Government at Harvard University.** This intensive 8-week program is designed for federal managers who are candidates for the Federal Senior Executive Service. The Senior Executive Fellows Program addresses problems faced by upper-level managers including planning coherent strategies; organizing policy-making processes, mobilizing support in an environment of shared responsibility; and structuring credibility with the media, oversight bodies, interest groups, and the special constituencies of the organization. The program provides an interactive environment for men and women with diverse intellectual backgrounds and career interests. AAC members in grades GS-15 and above may apply for this program, which is held each year beginning in late September.

• **The Josephson Institute of Ethics.** This course is taught by the president/founder of the institute, Dr. Michael Josephson. It focuses on the moral energy of people committed to making our society more honest, more caring, and more accountable. The course is held annually in the National Capitol Region between September and November.

• **The Weapon Systems Management Course.** This is a 3-week program that trains middle and top management personnel in the field of project management. Special emphasis is on joint activities in the field of procurement and in-service phase of weapon systems by North Atlantic Treaty Organization (NATO) allies. Participants gain knowledge of international cooperation and management in processing NATO armament programs. Only two seats per year are available for this program. The course is open to AAC members in grades 13/14/15 involved in international programs. Classes are held annually in Ottobrunn, Germany, in September.

Board Process

The evaluation process resulting in this year's selections for education and training programs is derived from two career development selection boards. First, the Deputy Director, Acquisition Career Management (DDACM) convened a board in January 1997 to consider AAC members for the SSC Fellowship Program at the ICAF. The board considered applicants for seven of the 10 ICAF seats allocated annually to the Army. The board also recommended the remaining files be forwarded to Department of the Army (DA) for consideration by the DA Secretariat SSC Fellowship Selection Board. The secretariat board selected three AAC members as principal candidates and two additional AAC members as alternates at-large. One of the alternates at-large was activated, resulting in a total of 11 AAC civilian members selected to attend the ICAF in 1997. The second selection board convened in May 1997. The purpose of the May board was to identify and select AAC members to attend long-term training, part-time training, and executive seminars beginning in July 1997, as announced in the *1997-1998 Army Acquisition Corps/Army Acquisition Workforce Civilian Training Opportunities Catalog.* This included selections to attend the SSC Fellowship Program at the Center for Development and Training at the University of Texas at Austin.

Composition of the Selection Boards

• **SSC ICAF Selection Board.** Board President: *COL Steven A. Dasher,* Director, Task Force XXI, Headquarters U.S. Army Materiel Command; Board Members: *Joseph Butler,* Project Manager, Arrow, Office of the Program Executive Officer, Air and Missile Defense; *Dr. Linda Gentle,* Chief, Program Management Division, Multiple Launch Rocket System Project Office, Office of the Program Executive Officer, Tactical Missiles; *Dr. James Nelson,* Director, U.S. Army Medical Materiel Development Activity, U.S. Army Medical Research and Materiel Command; *Richard M. Williams,* Chief, Policy and Administration Division, U.S. Army Cost and Analysis Center; *David Shaffer,* Chief, Logistics Analysis Activity, U.S. Army Materiel Systems Analysis Activity; *Estherline Morse,* Functional Chief Representative for Contracting, and Policy Representative, Defense Acquisition Regulatory Council, OASA(RD&A).

• **Long-Term Training, Part-Time Training, and Executive Seminar Selection Board.** Board President: *COL Paul E. Wolfgramm,* Director, Joint Precision Strike Demonstration (JPSD). Board members: *Sandra Rittenhouse,* Chief Acquisition Policy, Headquarters, U.S. Army Materiel Command; *Jerry L. Stahl,* Director, Strategic Planning and Integration, U.S. Army Simulation, Training and Instrumentation Command; *Robert J. Masucci,* Chief, Program Management Office, Air to Ground Missile Systems Project Office, Office of the Program Executive Officer, Tactical Missiles; and *Tom Metzler,* Project Manager, Aircrew Integration Systems, Office of the Program Executive Officer, Aviation.

Conclusion

Both AAC and DA secretariat selection boards show a significant increase in the number of AAC members selected for fellowship programs. The ICAF and CPDT Fellowship Programs have the highest number of AAC participants on record. Additionally, the number of other AAC long-term training selections is the highest in three years. These high rates reflect the quality that the AAC members bring to a highly competitive selection process. In view of this, AAC members selected for these programs should be commended for their outstanding record of demonstrated performance. Selection boards for programs offered to Army civilians in 1998 begin in January. At that time, the DA secretariat board convenes its annual selection board to consider applications for the SSC Fellowship Program. Application procedures for the SSC Fellowship Program are outlined in the FY97 catalog of *Civilian Training, Education and Professional Development Opportunities,* published by the Office of the Assistant Secretary of the Army (Manpower and Reserve Affairs) Civilian Personnel Management Directorate. This information is also available at: http://cpol.army.mil (Training and Career Development). Programs offered by the AAC are provided in the *Army Acquisition Corps/Army Acquisition Workforce Civilian Training Opportunities Catalog.* This information is also available at: http://dacm.sarda.army.mil.

J. M. WELSH is an acquisition education and training specialist in the Acquisition Education and Training Office, Office of the Assistant Secretary of the Army (RDA). He holds a B.S. degree in management, and is pursuing a master's degree in human resources development.

Editor's Note: The following article represents one man's opinion on two current and critical initiatives within the acquisition community: program management by integrated product teams and the Horizontal Technology Integration of new capabilities across multiple systems. The author's recent "total immersion experience" offers potential lessons learned that may assist today's acquisition professionals engaged in the business of Army modernization.

INTEGRATED PRODUCT TEAMS AND HORIZONTAL TECHNOLOGY INTEGRATION

By MAJ John Lesko (USAR)

Introduction

The observations and commentary offered in this article are from the point of view of a Reserve component member of the Army Acquisition Corps (AAC). Reservists often have a unique perspective since many are dropped into an organization, not unlike a traveler is dropped into a new environment, totally immersed in the culture of a foreign land. When we report for duty during annual training, we do not have the intimate, day-to-day knowledge of a weapon system, a program, ongoing staff action, or acquisition process that our active duty brethren can claim. We do, however, bring a fresh perspective to the job at hand. This perspective can significantly help a program office, headquarters staff, laboratory, or engineering center.

An Individual Mobilization Augmentee (IMA) may bring an academic or industrial point of view which, unlike that of a standing support contractor, is unencumbered by delivery orders or contract expectations. An IMA Reservist must sign a conflict of interest statement when working in the acquisition community. Ethical behavior is an absolute requirement.

The remainder of this article addresses the topics of integrated product teams (IPTs) and Horizontal Technology Integration (HTI). Where appropriate, quotations, references, and citations will be documented by pointing to official DOD Internet web sites.

Integrated Product Teams

The composition of IPTs within DOD will vary from project to project, program to program, and team to team. The leadership role within these IPTs will also vary just as the management styles of any two individuals vary. Situational leadership will dictate who should lead and when. The person "on point" will shift from team member to team member as the shared, collective task list is tackled. (On the web, see URL: *http://www.sarda.army.mil/ASARDA/SARD-ZP/TEMPHOLD/POLICY/PRODPROC.HTM* for policy guidance on the use of integrated product and process development and IPTs.)

Most IPTs have key individual roles or functions that, as a rule-of-thumb, must be fulfilled in order for the IPT to successfully accomplish its mission. These roles include:

- ***The Sponsor.*** This is a senior executive (or committee) within the formal organization who oversees the enterprise. Within the acquisition community, sponsorship comes from the Army Acquisition Executive (AAE), General Officer Working Groups (GOWG), the Army Systems Acquisition Review Council (ASARC), or the Joint Requirements Oversight Committee (JROC). Legal authority rests with the sponsor or sponsorship committee. For the Army, governing documents are identified and explained on the ASARDA web site: *http://www.sarda.army.mil/sarda/sardamsn.htm.*
- ***The Champion.*** This is a senior individual who works the interface between the IPT and the sponsoring organization. This may be the program executive officer, a member of Congress, or another influential executive. Champions come in many forms. Champions are immersed in the politics of a program. Comments on the politics of a program will remain beyond the scope of this article.
- ***The Project Leader.*** This is the project or program manager with the charter to deliver a product or process that meets performance specifications, within budget, on schedule, and which can be supported in the field. See *http://www.sarda.army.mil/peo-pm/peopm.htm.*
- ***The Technical Guru.*** This is the chief scientist, engineer, or technologist who "makes the call" on the selection of the best technical approach, performance and risk tradeoffs, and related technical matters. This technical leader or "guru"

As the Army evolves into its Force XXI or Army After Next configurations, tradeoffs will continually be made between the requirements of force structure, OPTEMPO, modernization, and infrastructure.

may come from a government laboratory, engineering center, or a contractor organization. Whoever the *de facto* guru is, he or she will undoubtedly confer with their peers at professional society and trade association meetings. The nature of scientific and technical work is evolving to a new computer-mediated form. See URL: *http://www.dtic.mil/summit* for a glimpse into information-based tools now available to technical gurus.

• ***The Technical Gatekeeper.*** This is the "scout" who keeps his or her eyes and ears open for appropriate technologies or off-the-shelf tools available to the team. This is not a trivial role, for history records a long list of innovations that come from outside "conventional wisdom" or the "expert" organization. For example, the automobile was not invented by the transportation experts of that era, the railroaders. Polaroid film was not invented by Kodak, nor hand-held calculators by IBM. The technical gatekeeper first gets the IPT or team interested in what they might become and not in what the organization has been. (Thomas E. Cronin, "Thinking and Learning About Leadership," as found in *Military Leadership: In Pursuit of Excellence,* Westview Press, 1992.)

• ***Various Ad Hoc Support Personnel.*** These are group facilitators, accountants, contract specialists, scribes, and any other administrative support personnel who contribute in their own way to the success or failure of an IPT. Passage of the Defense Acquisition Workforce Improvement Act (DAWIA) in 1990 marked the beginning of a Defense commitment to becoming a learning organization. The Defense Acquisition University (DAU), and the network of schools it oversees, works to build professional, well-educated and trained staff at all levels of the acquisition workforce. See URL: *http://www.acq.osd.mil/dau/.*

This model for understanding the dynamic roles of IPT participants is not new. Successful R&D teams have long adopted this model or adapted it to their particular situation. Similar organizational structures have allowed IPTs to become true innovators, first to market, or leaders in their respective technology-driven industries.

Horizontal Technology Integration

The latest round of acquisition reforms has spawned many programs and initiatives. These include the institutionalization of the Army's Battle Labs, the use of the Advanced Concepts and Technologies (ACT II) Program, the Advanced Warfighter Experiments (AWE), the Fast Track Program, the Army's Reinvention Laboratory, the Warfighting Rapid Acquisition Program (WRAP), etc. To the uninitiated, this "alphabet soup" can be daunting. This author will not rehash or even summarize what has been published in *Army RD&A* and other Defense journals on these programs and initiatives. However, on the Horizontal Technology Integration process or HTI concept, I offer the following observations and suggestions:

• The basic premise of HTI is that it should be significantly cheaper to modernize the Army if program managers share in the development of common subsystems and components across the entire fleet of vehicles or weapons platforms. The horizontal integration of technology, fielded in a modular way across many systems, eliminates costly, redundant developmental efforts. The HTI process results in savings to the Army and is, therefore, a "budget multiplier."

• HTI has been the concept behind the successful Second Generation Forward Looking Infrared (FLIR) system. As the Thermal Weapons Sight (TWS) and the Driver's Vision Enhancer (DVE) become HTI systems and enter the field, the total force is better off. Combat, combat support, and service support units will reach a new level of readiness, for these units will share in a better, more balanced, night vision capability. HTI harmonizes the capabilities for pilots, tank crews, and truck drivers alike. There will be fewer "have not" units and in the future, all elements of our ground force will "own the night." HTI is a "combat multiplier." See URLs: *http://www.monroe.army.mil/pao/awe1.htm* and *http://www.irwin.army.mil.*

To view related articles from back issues of *Army RD&A,* see *http://dacm.sarda.army.mil/publications/rda/.*

• Invite more industry participants to the quarterly and semiannual HTI information exchange meetings. These gatherings, without industry participation, may become limited, lopsided forums with the Army preaching to the converted. Industry members must become more actively engaged in the HTI dialogue. In fact, they must become full partners in any materiel acquisition. The HTI process must become a recurring theme at industry sponsored trade shows and conferences. With the merger of the American Defense Preparedness Association and the National Security Industrial Association, this author suggests that ADPA-NSIA is a good place to start an industry outreach effort. See URL: *http://www.adpa.org.*

Conclusion

As the Army evolves into its Force XXI or Army After Next configurations, tradeoffs will continually be made between the requirements of force structure, OPTEMPO, modernization, and infrastructure. Tanks, fighting vehicles, and aircraft will continue to need upgrades. And history suggests that RDT&E budgets are likely to evaporate more quickly than missions.

The HTI process, once opened up to industry and creatively executed by integrated product and process development teams, should provide a better way to modernize and improve the force. With continued collaboration between industry and government, cooperation among affected program managers—plus a little rearranging of the letters—the HTI process should become a HIT.

JOHN LESKO is a principal research scientist with the Battelle Memorial Institute. A member of the Army Acquisition Corps' Reserve component, he is a graduate of the U.S. Military Academy, the Army Command and General Staff College, and Boston University. Additionally, he is co-author and co-editor of Technology Exchange in the Information Age, a guide for government and industry technologists who wish to form successful cooperative R&D partnerships.

U.S. ARMY MATERIEL COMMAND NEW DEPUTIES FOR SYSTEMS ACQUISITION

By COL Leon A. Parker III

Introduction

As a result of the Army Science Board (ASB) study on reengineering the institutional Army, and the Assistant Secretary of the Army for Research, Development and Acquisition (ASARDA) study on the implementation of the ASB's initiatives, Acquisition Category (ACAT) II/III project and product manager offices were identified for transfer to the U.S. Army Materiel Command (AMC).

To support the expanded acquisition mission within AMC, the Secretary of the Army approved the establishment of three new brigadier general positions titled, "Deputy for Systems Acquisition (DSA)." The new positions are located at the U.S. Army Communication-Electronics Command (CECOM), Fort Monmouth, NJ; the U.S. Army Tank-automotive and Armaments Command (TACOM), Warren, MI, and the recently formed U.S. Army Aviation and Missile Command (AMCOM), Redstone Arsenal, AL.

Position Responsibilities

The new DSAs will develop command policy and plans, and manage the integration, coordination, and execution of systems acquisition and project management missions. The DSA positions have full line authority of the Army Acquisition Executive and Commanding General in carrying out systems acquisition and project management activities. The DSAs will

The new Deputies for Systems Acquisition will develop command policy and plans, and manage the integration, coordination, and execution of systems acquisition and project management missions.

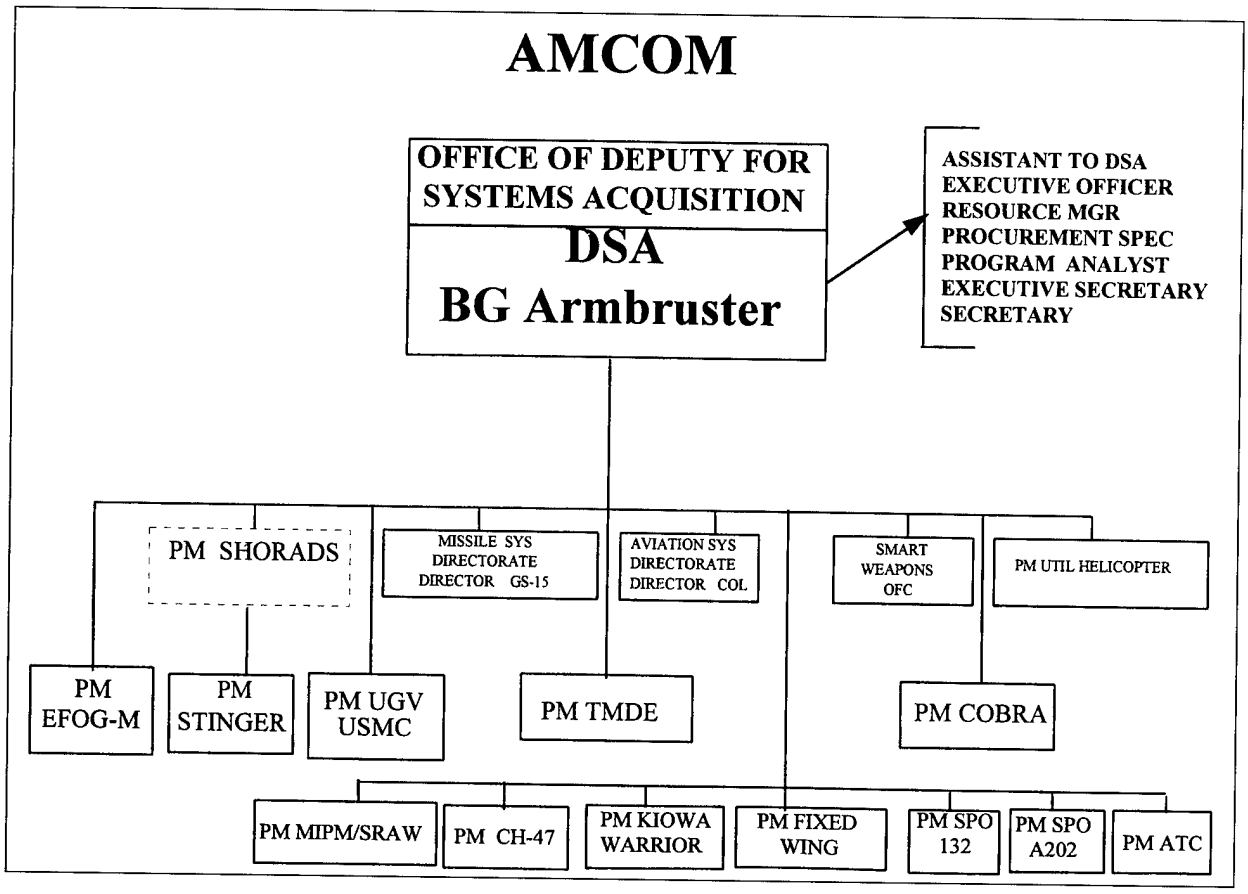


Figure 1.

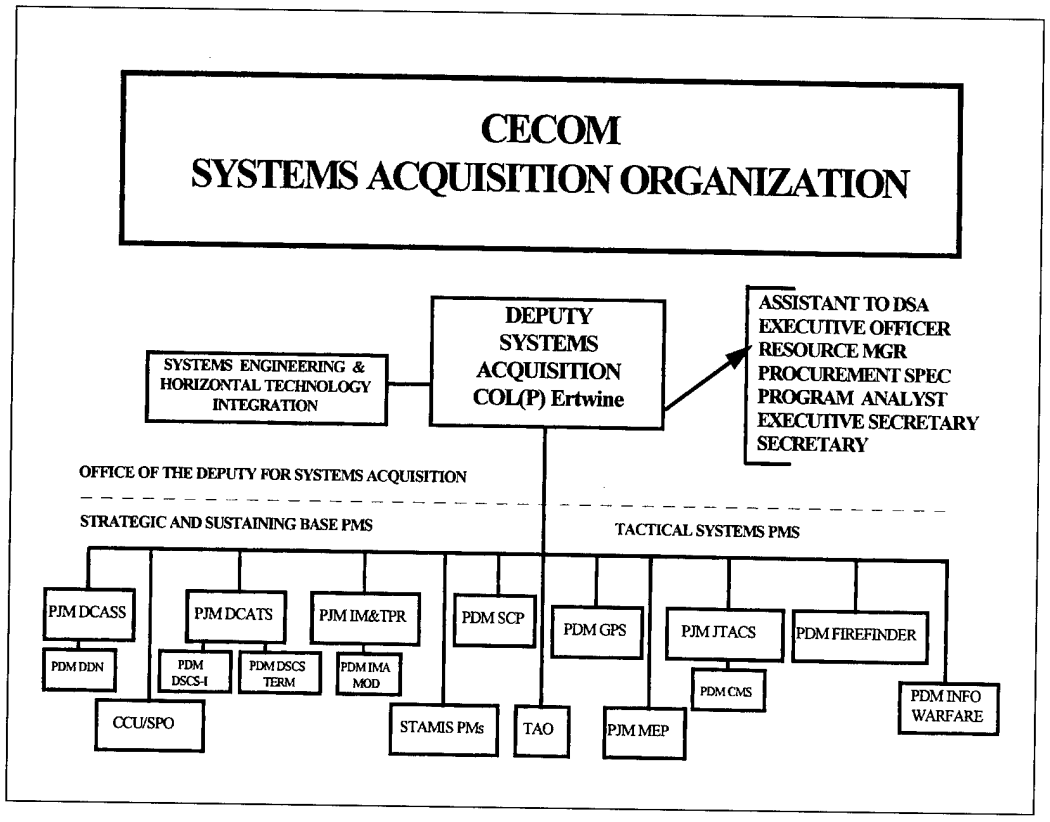


Figure 2.

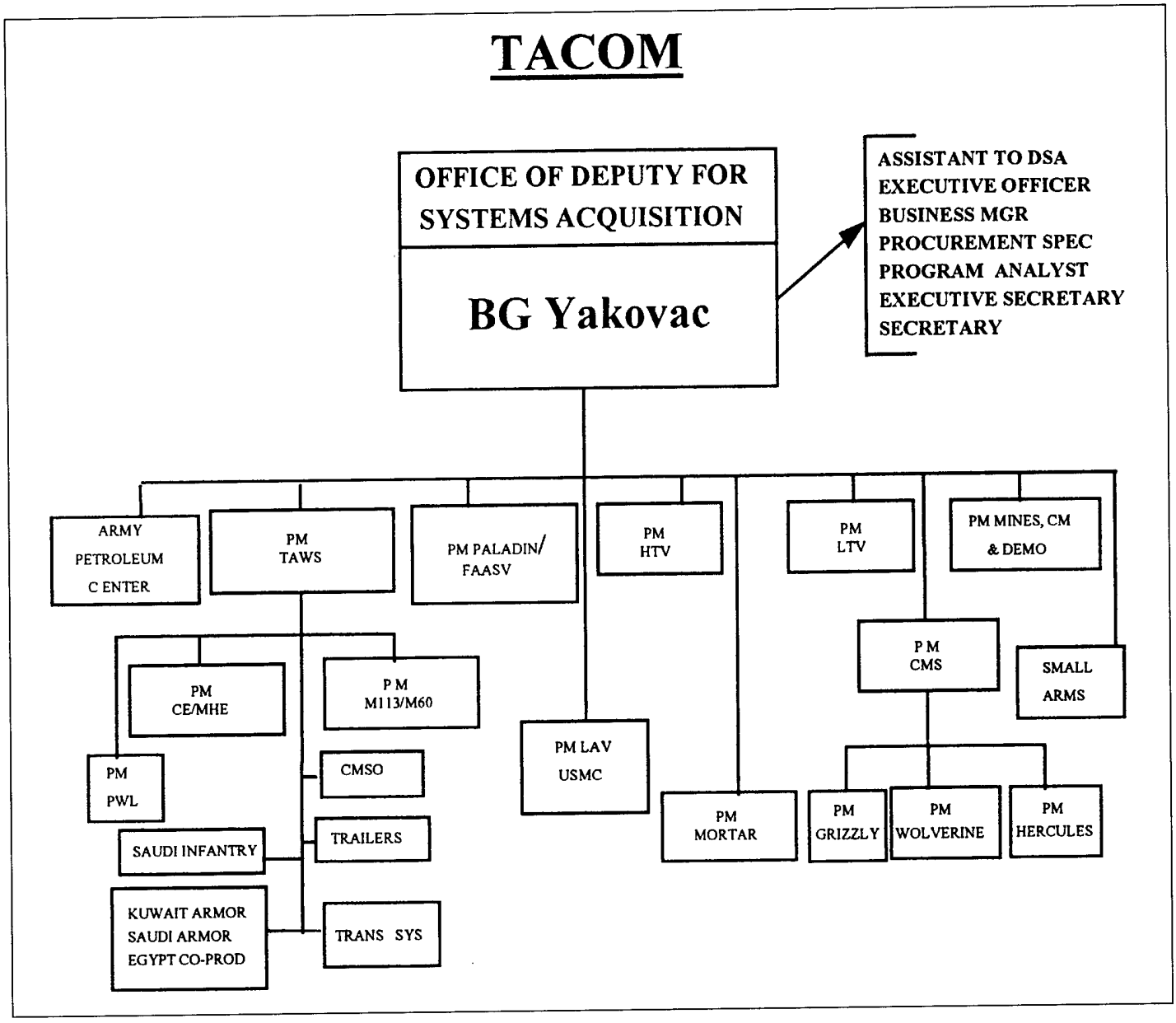


Figure 3

provide guidance, direction, control, oversight, and support to ensure systems are developed in accordance with technical architecture and supportability requirements while minimizing life cycle cost. The DSA will represent the Commanding General during discussions with HQ AMC, the Department of the Army Staff, the Assistant Secretaries of the Army, the Assistant Secretaries of Defense, members of Congress and congressional staffs, members of Defense industries, and other groups concerning systems acquisition, systems development activities, and project management.

Similar To The Program Executive Officer (PEO), But...

The DSA Offices manage the extensive operations utilizing a very streamlined office. At the direction of GEN Johnnie E. Wilson, Commander, AMC, the Offices of the DSA are limited to a total of seven to nine people, and will depend on matrix support from the major command (MACOM) headquarters to fulfill those functions not covered in the DSA office. The three DSA organizations at AMCOM, CECOM, and TACOM, respectively, are depicted in Figures 1-3.

The DSA positions have full line authority of the Army Acquisition Executive and Commanding General in carrying out systems acquisition and project management activities.

THE NEW DEPUTIES

BG Joseph L. Yakovac, TACOM DSA

In January 1997, BG Joseph L. Yakovac became the first AMC DSA when he was appointed the DSA for the U.S. Army Tank-automotive and Armaments Command, Warren, MI. He was born in McKeesport, PA, on July 8, 1949, graduated from West Point and was commissioned a second lieutenant in the Infantry in 1971.

His military assignments include Infantry Platoon Leader, 4th Infantry Division, Fort Carson, CO; Commander, Headquarters/Headquarters Company, 1st Battalion, 4th Infantry Division, Fort Carson, CO; and Assistant Professor of mechanics at West Point.

His acquisition assignments include Project Officer, U.S. Army Force Development Support Agency, Armor/Anti-Armor Special Task Force; Assistant Program Manager, Bradley Fighting Vehicle, U.S. Army TACOM; Director, Weapons Systems Management, U.S. Army TACOM; and Project Manager, Bradley Fighting Vehicle Systems.

BG Yakovac holds an undergraduate degree from the U.S. Military Academy at West Point and an M.S. in mechanical engineering from the University of Colorado.

His military education includes the normal military officer schools, the Defense Systems Management College Program Management Course, and the Industrial College of the Armed Forces.

BG Robert E. Armbruster, AMCOM DSA

BG Robert E. Armbruster became the DSA for the U.S. Army Missile Command in April 1997, and transitioned to the same position for the U.S. Army Aviation and Missile Command in July 1997. He came to this position from the U.S. Army Space and Strategic Defense Command in Huntsville, AL, where he served as the Deputy Commanding General.

BG Armbruster was born in Rockville, NY, on June 27, 1949, graduated from West Point and was commissioned a second lieutenant in the Military Intelligence Corps in 1971.

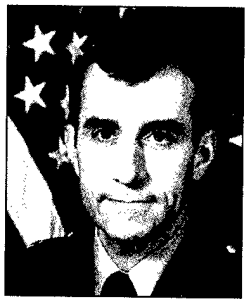
He served as Tank Platoon Leader in the 3rd Armored Cavalry Regiment, commanded A Company, 7th Radio Research Field Station in Udorn, Thailand, and was an associate professor of mathematics at West Point.

BG Armbruster's first acquisition assignment was Chief, Signals Development Laboratory at Vint Hill Farms Station, VA. Subsequently, within the PEO for Tactical Missiles, he served as Assistant Project Manager for development, Multiple Launch Rocket System (MLRS); Product Manager, MLRS Sense and Destroy Armor; Product Manager, Multipurpose Individual Munitions; Product Manager, Longbow HELLFIRE; Project Manager, Tube-Launched, Optically Tracked, Wire-Guided (TOW); and Project Manager, Close Combat Anti-Armor Weapon Systems.

BG Armbruster holds an undergraduate degree from the U.S. Military Academy at West Point, an M.S. degree in industrial engineering from the University of Arizona, and a professional engineering license from Virginia.

His military education includes the normal military officer schools; the Thai Language School at the Presidio of Monterey, CA; Training With Industry at Martin Marietta, Orlando, FL; the Defense Systems Management College Program Management Course; and the Army War College.

BG Dean R. Ertwine, CECOM DSA



BG Dean R. Ertwine is the newest of the AMC DSAs. In mid-September 1997, he assumed his position as the CECOM DSA, Fort Monmouth, NJ.

Previously, he was assigned as the Executive Officer to the Assistant Secretary of the Army (Research, Development and Acquisition).

Born in Danville, PA, on Sept. 15, 1950, he graduated from West Point and was commissioned a second lieutenant in the Field Artillery Corps in 1972. He served as a forward observer in the 1st Infantry Division (Forward), U.S. Army Europe and Seventh Army, Germany; commanded A Battery, 2d Battalion, 37th Field Artillery, Fort Sill, OK; and was Assistant Professor, Department of Chemistry, at West Point.

BG Ertwine's acquisition assignments include Chief, Artillery and Hazards Branch, and Director, Materiel Testing, U.S. Army Dugway Proving Ground, UT; Commanding Officer, U.S. Army Cold Regions Test Center, Fort Greely, AK; and Commander, Fire Support Armaments Center, U.S. Army Armaments Research, Development and Engineering Center, Picatinny Arsenal, NJ.

BG Ertwine holds an undergraduate degree from the U.S. Military Academy at West Point and master's and doctorate degrees in chemistry from Lehigh University.

His military education includes the normal military officer schools; Training With Industry at McDonnell Douglas Technologies, San Diego, CA; and the Industrial College of the Armed Forces.

COL Leon A. Parker, III is assigned to Headquarters, AMC, Office of the Deputy Chief of Staff for Research, Development and Acquisition, as Chief of the Program Management and Acquisition Support Office. He is a graduate of Morgan State University, Baltimore, MD, where he received a bachelor's degree in mathematics and was a Distinguished Military Graduate. He is a graduate of the Systems Automation Course, Command and General Staff College, and the Program Management Course, Defense Systems Management College, and is a member of the Army Acquisition Corps.

CHIEF INFORMATION OFFICER ASSESSMENT

By Ronnie E. Gerstein
and Helen Letmanyi

On Feb. 10, 1997, the Information Technology Management Reform Act (ITMRA) of 1996 became law throughout the government in Public Law 104-106. Implemented on Aug. 8, 1996, this law established a Chief Information Officer (CIO) for each executive agency, e.g., the military departments. The law was later renamed the Clinger-Cohen Act. (A complete explanation of ITMRA is available on the Internet at **http://www.cio.fed.gov.**)

Through its key provisions, ITMRA repealed the Brooks Act, 40 U.S.C. Section 759. (The limitations and conditions in delegation of procurement authority issued under the Brooks Act remain in effect unless amended or terminated by the contracting officer.) It mandated that the CIOs report directly to the CEO, i.e., Secretary of the Army. The Secretary of the Army designated the Director of Information Systems for Command, Control, Communications, and Computers (DISC4) as the Army CIO and the Vice DISC4 as the Deputy CIO.

The law also increased the Secretary of the Army's responsibility, authority, and accountability for the use of information technology (IT) and other information resources in performing Army missions. It included National Security Systems (NSS). NSS are defined as any telecommunications or information system operated by the U.S. government, the function, operation or use of which involves intelligence activities, cryptologic activities related to national security, command and control of military forces, or equipment that is an integral part of a weapon or weapons system. The Army has designated these as Command, Control, Communications, Computers, and Intelligence (C4I) systems.

The CIO, as one of 28 Executive Agency CIOs, is a member of the Federal CIO Council. The CIO is also a member of the DOD CIO Council.

The new law further mandated process assessment or business process reengineering and, where appropriate, that the process be reengineered prior to system selection. This reengineering may preclude the need for a new or upgraded system. It provided mechanisms to increase the effectiveness of the Army's use of information resources and to improve the Army's IT/C4I performance for programs, systems, and processes to levels comparable with the best achieved in the private sector. The law requires that before any process improvement begins, the following questions must be considered:

- Does the process support core/priority mission functions?
- Can the process be eliminated?
- Can the process be accomplished more efficiently by another federal organization, e.g., another major command (MACOM) or even another organization within the same MACOM?
- If the process is still needed, can its execution be outsourced entirely or in part?

ITMRA emphasizes performance-based and results-based management of IT/C4I systems, rather than the process-oriented IT procurement system that existed under the Brooks Act. IT/C4I procuring activities should focus on IT investments which improve the effectiveness or efficiency of agency programs in support of mission goals.

The law emphasized the importance of completing effective capital planning and process improvements before applying IT/C4I solutions to the execution of agency plans and the performance of agency missions.

The responsibilities prescribed in the Paperwork Reduction Act (PRA) of 1995, as amended, remain in effect.

The Secretary of the Army approved the CIO Implementation Plan on July 15, 1997. Available on the CIO web site, it includes some of the following guidance:

- Users will submit all IT/C4I requirements, including new starts or upgrades,

The Chief Information Officer Assessment is to promote one of the major tenets of the Information Technology Management Reform Act, that is manage information technology programs as investments rather than as acquisitions.

To successfully implement the Information Technology Management Reform Act, the Army must accept new ways of doing business, embrace the need to treat information technology expenditures as investments, and ensure that investments in information technology provide measurable improvements in mission performance.

through the U.S. Army Training and Doctrine Command (TRADOC) requirements process. As a part of TRADOC's worldwide staffing, the CIO will validate these requirements based on whether a Business Process Redesign (BPR) has been completed, and an evaluation of information security requirements, emerging technologies, and other criteria. Authority for ACAT IV Systems (under $10 million) have been delegated to the MACOMs, which must follow a like requirements process.

- The CIO will advise the Secretary of the Army whether to continue, modify or terminate a system.
- The CIO will designate a colonel or GS-15-level representative on each Program Evaluation Group. The CIO or his representative will also participate in each of the other Planning, Programming, Budgeting and Execution System committees.
- The CIO has been named the Army Enterprise Architect and the Systems Architect. (TRADOC is the Operational Architect and the Army Acquisition Executive was designated the Technical Architect.) The Army Technical Architecture has been redesignated as the Joint Technical Architecture, Army.
- The CIO is the Technical Advisor and has approval authority for BPRs with an IT/C4I impact. The CIO will disseminate guidance concerning this responsibility in the near future.
- Major commands and subordinate organizations may, at their discretion, designate their own CIOs and establish supporting offices at their organizational levels.
- The CIO will develop a CIO Assessment for use by the Milestone Decision Authority (MDA) during Milestone Decision Reviews.

The CIO Assessment is to promote one of the major tenets of the ITMRA, that is manage information technology programs as investments rather than as acquisitions. The emphasis must be on achieving outcomes that contribute to mission effectiveness, rather than simply meeting contractual requirements. The CIO Assessment implements the ITMRA, the Government Performance and Results Act (GPRA) of 1993, the PRA of 1995, and other DOD and Army regulatory requirements.

To satisfy the above statutory and regulatory requirements (based on DOD's requirements matrix), the Office of the DISC4 developed the CIO Assessment and DOD Program Requirements Matrix. The matrix correlates the ITMRA, GPRA, and PRA requirements with other statutory and regulatory acquisition requirements. In addition to these requirements, the matrix includes a list of high-level items, questions (not inclusive) that need to be addressed, and the criteria to be used to determine the status of compliance. To help ensure program success, working-level integrated product team/integrated product team (WIPT/IPT) members will consider these requirements as programs progress through the acquisition process.

The CIO Assessment and DOD Program Requirements Matrix is applicable to all IT acquisitions, ACAT ID through ACAT IV programs. IT acquisitions for ACAT ID through ACAT IIA programs will be assessed by the Army CIO to ensure compliance with applicable provisions of statutory and regulatory requirements. The November 1996 *SARDA Guide for the Preparation of Army Acquisition Programs for Review by the Army Systems Acquisition Review Council* has been modified to include both Army Systems Acquisition Review Council and Major Automated Information System Review Council programs, and will be republished as DA Pamphlet 70-3. The process and procedures will be essentially the same for both areas. One of the major changes in the guide is the inclusion of the CIO Assessment. For these acquisition categories, the Army CIO will provide an assessment to the MDA through the WIPT/IPT process. The CIO Assessment will be documented in the Modified Integrated Program Summary in the Assessment Memorandum, Annex C. ACAT III and ACAT IV programs will also be assessed against the requirements identified in the matrix at the appropriate MDA level (i.e., program executive officer).

To successfully implement the ITMRA, the Army must accept new ways of doing business, embrace the need to treat IT expenditures as investments, and ensure that investments in information technology provide measurable improvements in mission performance.

RONNIE E. GERSTEIN is the Director for Chief Information Officer (CIO) Integration in the Office of the DISC4. She has held other ODISC4 positions to include the Assistant Deputy Director for Plans and the Army Visual Information Officer. An Army War College graduate, Gerstein holds a B.S. degree from the University of Maryland in business and management, and an M.B.A. degree from Bradford University, England.

HELEN LETMANYI is responsible for software acquisition policies and the implementation of the Chief Information Officer Assessment. She has over 25 years of federal agency experience in the information resources management area. Letmanyi received her education in Hungary with an M.S. degree in economics.

QUICK RESPONSE TO URGENT NEEDS

By COL Steven A. Dasher and LTC Robert Kocher

Introduction

In today's military operations, U.S. soldiers are faced with unique missions and environments where traditional military equipment is not the optimal solution. Rapid advancements in commercial-off-the-shelf (COTS) and ongoing technology efforts have produced products and technologies that can help the deployed user with urgent needs. Urgent needs continue to change against an ever-changing threat. Over the past few years, ad hoc projects have been implemented, with varied degrees of success, to help U.S. soldiers in Somalia, Haiti, Bosnia, Macedonia, Croatia, Korea, and Southwest Asia by delivering significant amounts of equipment. The photographs accompanying this article depict some of the environments and situations being addressed by quick response projects.

Valuable lessons were learned through these experiences about new ways of doing business with deployed users. The U.S. Army Materiel Command (AMC) has transformed the ad hoc approach for quick response to a defined process implemented through a group called the Quick Response Office (QRO). The QRO's mission is to support all Service members in urgent condition environments. This is accomplished by providing solutions and recommendations to solve potential problems. Delivering products within the critical timeframe required by the user is a significant challenge requiring extensive training and preparation to complete the event in world class time.

Quick response projects are designed to deliver not only the ***right products*** to a user with an urgent mission but, also, to get them there ***in time to make a difference.*** These are the two main elements composing a quick response project, with success or failure measured by achievement of these two elements and their corresponding subelements.

Determination of the ***right product*** begins with a fundamental understanding of the problem and the user's requirements. This includes not only those problems currently being faced but also a projection of the user's future problems and needs. Concurrently, available technologies and products are developed to answer a wide range of potential user problems. From this data base of potential solutions, technologies and/or products are correlated to the problems and requirements offering the best opportunity for delivering the greatest value to the user. These most likely solutions are then developed for presentation to the user with detailed program plans and acquisition strategies. The user is then able to select the best option to solve the requirement based on a comprehensive package outlining products, performance factors, delivery times, quantities, ease of use and cost.

When a deployed user has an urgent need, fixes are needed now; consequently, a fix must arrive ***in time to make a difference.*** When U.S. Service members' lives are in imminent danger, we have to run at the fastest pace and make the right decisions every time. Timelines for quick response projects may vary from one week to four months, with an "average equipment on the ground" goal of just one month from the date of the user's formal request. To meet these timelines, it is critical that funding and acquisition functions be performed with as little delay as is feasible. Rapid identification of supporting organizations and sources of funding are critical at this point to facilitate moving the action into the hands of a procurement agent. Once in the hands of a procurement agent, rapid contracting is necessary through intensive management initiatives to procure the item. Simultaneously, transportation planning, the field support maintenance (and spares) plan and user operational evaluations (to include product design/configuration modifications, as required) are performed to permit the items to be placed in the hands of the ultimate user in the shortest time span possible.

As shown in Figure 1, the quick response model is composed of constant and iterative steps which necessitate close contacts among the users from all Services, joint staffs, and development communities. A fundamental strategy for quick response must incorporate both proactive and deep involvement in the total process via a "facilitating" role. This means advising the user with product selection while assisting the program manager (PM) with product or technology insertion. Thinking through potential events, user missions, and potential problems prior to any urgent request, the QRO enables the acquisition community to stay a step ahead. Using a 12-month projection window, personnel examine emerging world situations which have the potential of generating urgent requests for deployed or deploying U.S. forces. A wide range of sources contributes to these projections such as the joint staff, the Army Deputy Chief of Staff for Operations, and the intelligence communities. In addition, QRO personnel constantly monitor world events. When a short list of scenarios has been forecast, specific mission profiles are studied to determine if technologies could contribute to force protection or mission enhancement.

Integrated Product Team

Quick Response projects require application of an integrated Product team (IPT), representing a broad range of functional expertise. The QRO provides a core capability of quick response common functions such as communications, coordination, transportation, administration and budget. The QRO does not have any of its own products to represent, nor does it serve as a proponent for any other military Service project managers. This avoids the perception by the user that the QRO is attempting to "sell" them something and maintains the QRO reputation of being impartial. A quick response IPT is formed in conjunction with a PM once the user selects the product to solve his problem. The QRO then uses its unique expertise to facilitate the fielding of these products into the user's area of responsibility.

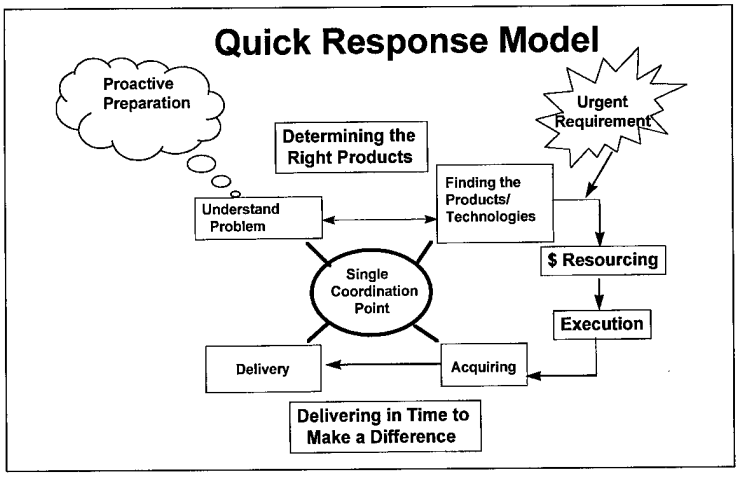


Figure 1.

Example Options Chart: Body Armor

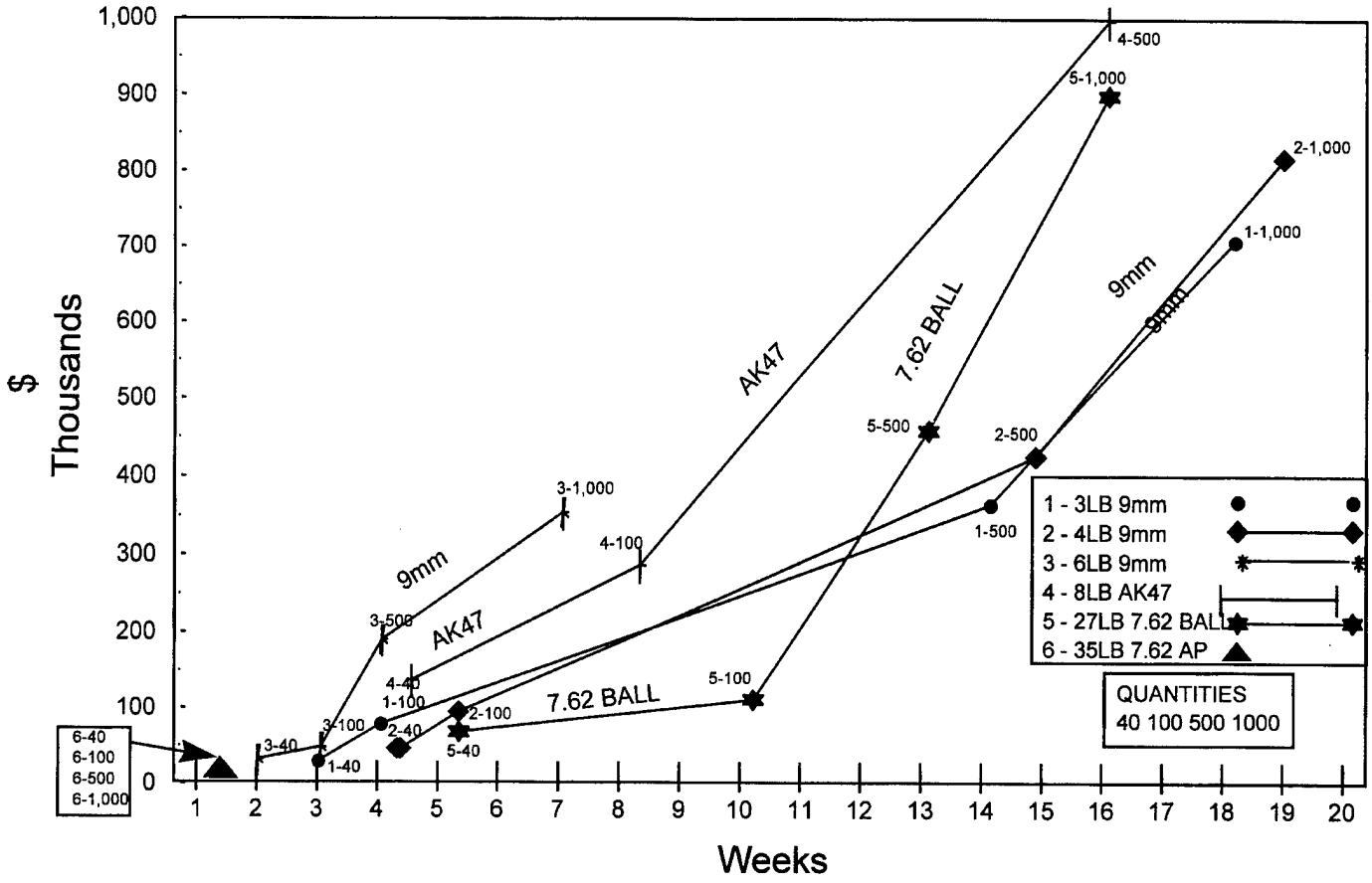


Figure 2.

The Right Products

Next, a search is conducted for potential products and technologies. This search involves contacting knowledgeable persons in government and industry in order to collect data and potential vendors as sources of selected products and technologies. For example, if a need is identified for satellite communications telephones, QRO personnel quickly conduct a market survey and seek advice from government personnel having subject matter expertise. Survey data is evaluated with respect to maturity, user friendliness, reliability, maintainability and supportability, along with performance or operational data. Results are categorized and entered into the quick response database along with the names of all industry and government points of contact (POCs).

As a user's needs are refined, information on the product is retrieved from the database. During this period, contact with the POCs is re-established and a comparison chart is developed. The parameters for the comparison charts contain *delivery time, total cost* and various *quantities* of deliverable items. The goal of the comparison chart is to lay out all technology options so the user can make a clear, rapid decision (see Figure 2).

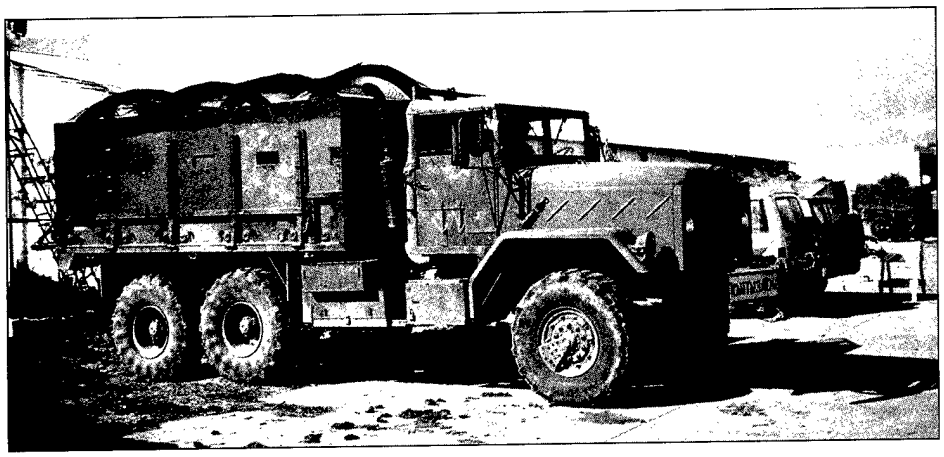
Obtaining a rapid decision (one way or the other) from a deployed user is a significant challenge and represents the culmination of the "right-product" phase. Decisions must be made quickly or the entire process significantly slows down. Users must receive an unbiased assessment of options, then quickly decide if a technology fix is feasible or not. If a material fix is selected, then the R&D community must begin rapid execution. If the user elects not to select a product, the search process is halted with the user then focusing on an operational fix.

Once the developer and user agree on the products needed for delivery and the corresponding timeline, the user either sends a message through the commander-in-chief (CINC) to the joint staff requesting funding, or supports the item from internal resources. The best scenario from the perspective of both the user and the materiel developer is to obtain an item which is stocked in a government agency or in reserve (such as war reserve). In most cases, these items can be made available for issue to meet the urgent requirement. If the required item is available from a non-deployed unit which does not currently need it, then a lateral transfer of property may also be feasible. In these cases, the key subelements affecting execution of the quick response project are transportation, training and support.

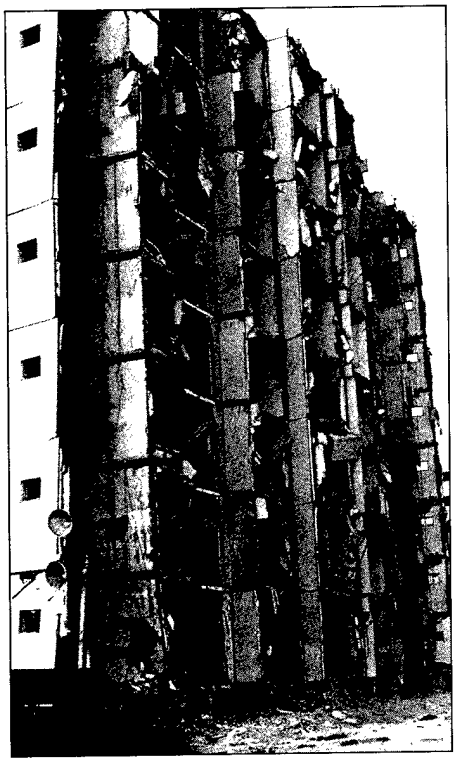
In Time To Make A Difference

If the government does not own the items, or if modifications are desired, the process is more complex. The process of determining the right product with the user should take less than four days. In most cases, this holds true with the caveat that the user may eventually elect to modify quantity and/or configurations as deliveries occur or as the situation changes. This need may result because of the rapidly changing threat since the user is not sure of the product's performance or the quantities necessary to meet a projected threat. Thus, the best approach may be to deliver

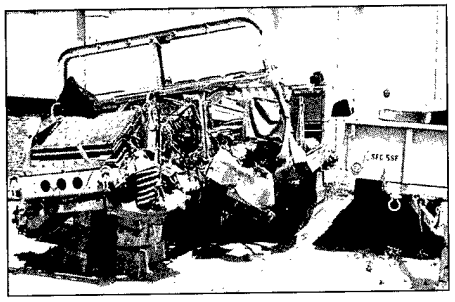
QUICK RESPONSE EFFORTS



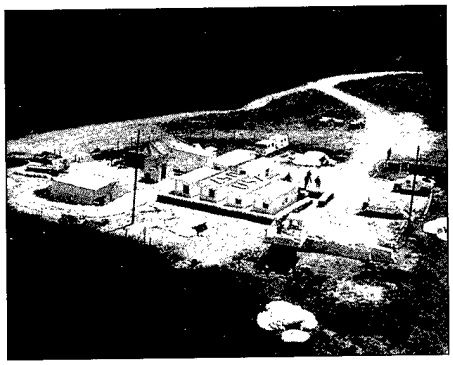
Armored 5-Ton Troop Truck, Haiti.



Khobar Tower, Saudi Arabia.



Minestrike, Somalia.



U.S. Border Mission, Macedonia.

a few items and allow the user to evaluate them and order rapid delivery of additional quantities or return the items if unsatisfactory.

An urgent, generalized request from the field is first presented to resource managers within two to five days of initiation of an event which precipitated it (such as an emergency deployment of a task force in response to a non-combatant evacuation operation (NEO) situation). Staying on top of the urgent event is key. Resource managers and decision makers must often make procurement and financial decisions when an urgent request is less than a week old.

Increased amounts of time devoted to problem analysis and planning further shortens the window of opportunity available for a "go-ahead" decision by the appropriate command authority. Constant and persistent preparation must be exercised to assist the user in selecting the appropriate product to answer the need. For this reason, the chances of success are substantially increased through proactively organizing and planning the project effort vs. reactive ad-hoc execution after an event occurs.

The QRO's expertise is not in the underlying technical and scientific underpinnings of the technology areas but, rather, in managing the compression of the overall timeline and acquisition cycle. QRO personnel must be experienced in understanding user needs, searching for options and alternatives, conducting evaluations, and then implementing plans which optimize cost, schedules and performance parameters. In the past, QRO personnel have assisted users in obtaining funding by leveraging AMC, Department of Transportation, Department of Defense, Navy and Air Force contracting agents.

The QRO monitors and assists other program managers with expediting deliveries. QRO personnel have been successful in coordinating product testing, safety certification, transportation, training needs, field support and product evaluations.

Lessons Learned

The technology used to solve a problem is only one component of a quick response project. An equally important component is to fully understand the actual situation faced by the user which initially generated the problem. For example, the identification of the Light Armored Mine Plow and Roller and Titanium Mine Probes proved to be ideal solutions to mine problems faced by U.S. forces deploying to Bosnia. Detailed interaction between the materiel developer and combat engineer users during an on-site Bosnia survey made this possible.

Further, the simple solution is often the best answer to a particular problem rather than a more glamorous "bells-and-whistles" solution. The latter may actually fail to provide an improved solution and, in fact, cost substantially more while creating confusion. Complex solutions may also delay decisions by commands because the command must have a clear understanding of the technology involved. A good approach is to quickly deliver a few prototype items to the user so that he can better understand the equipment and evaluate its value. Once the user tries the equipment, he can request additional quantities.

In most of today's deployment scenarios, units may have a three- to six-month rotation cycle, necessitating that a quick response item be simple to operate and maintain. Complex systems have not fared well in these environments and are frequently shelved by follow-on units.

Conclusion

The quick response proactive approach is a paradigm shift from the traditional acquisition process and a new approach developed through the acquisition reform initiatives. This comparison is shown in Figure 3. Traditionally, acquisition of new weapons systems has been intensive, with develop-

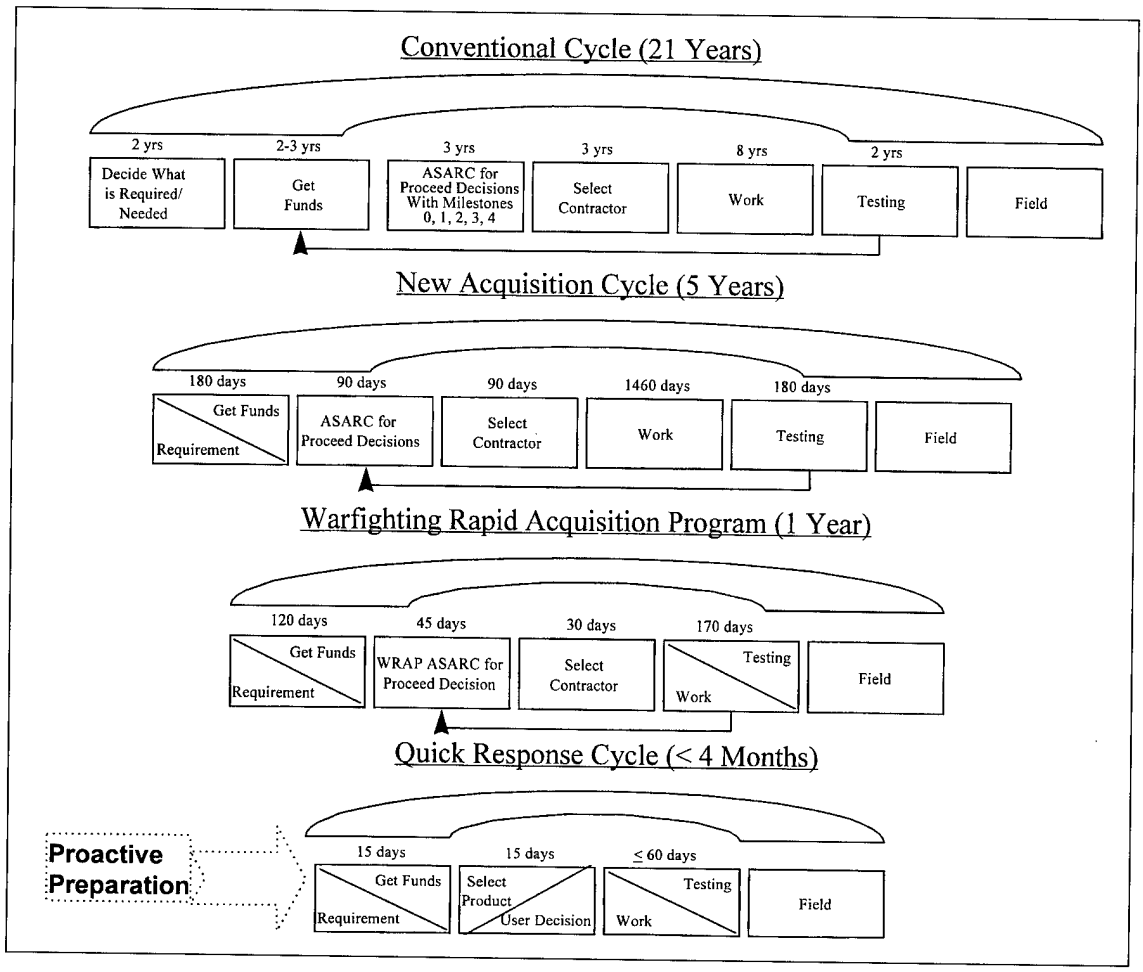


Figure 3.
Quick response vs. traditional approach.

mental efforts lasting an average of 21 years, depending on the size and complexity of the system. The new model developed within the acquisition reform umbrella has slashed this time to just five years through management streamlining and concurrent execution of program functions. The Warfighter Rapid Acquisition Program (WRAP) seeks to reduce these timelines for products emanating from Battle Lab warfighting experiments, Advanced Technology Demonstrations, or Advanced Concept Technology Demonstrations. WRAP is designed to jump-start the streamlined acquisition process for advanced technology transitioning from experimentation to acquisition. Since the quick response model is focused on either government-owned or commercial-off-the-shelf items, achieving efficiencies through concurrency is even more pronounced. While time spent on problem definitions, requirements, technologies and acquisition strategies are expanded by virtue of a continuous, on-going process, intensified efforts are able to be expended on funding, acquisition and testing, certification, training and fielding for identified new requirements. This significantly speeds completion of the projects to meet the one- to four-month window.

The following are some of the quick response projects, with varying levels of success, executed over the past five years for CINCs in Europe, Southwest Asia, Africa, Central America and Korea: armored High-Mobility, Multi-Wheeled Vehicle (HMMWV) kits; Infrared mine detection; special personnel communicators; long-range airborne observation systems; special body armor; materiel tracking tags; troop protection kits for 5-ton trucks, helicopter alert and tracking system; soldier 911 alert system; vehicle alert and tracking system; commercial car armor kits; explosive detectors; digital cameras; armored vehicles; ballistic blankets; anti-terrorist driver training teams; and armored 5-ton truck kits.

The QRO proactive approach has proven to be faster and more coordinated than those resulting from previous ad-hoc efforts. The QRO stands ever ready to assist the user by providing information on technologies and product options, as well as to execute, if requested, quick response projects. The ultimate goal is always to deliver the ***right equipment in time to make a difference***.

COL STEVEN A. DASHER is Chief, Force XXI and Emerging Technologies in the Office of the Deputy Chief of Staff RD&A, HQ, AMC. He holds a bachelor's degree in industrial engineering from Georgia Tech and an M.S. degree in business administration from Boston University.

LTC ROBERT KOCHER is a program manager for the Quick Response Office. He holds a B.S. degree from the U.S. Military Academy and a master's in mechanical engineering from Rice University.

CONDUCTING COLLABORATIVE RESEARCH WITH NONTRADITIONAL SUPPLIERS

By Dr. Kenneth Horn,
Dr. Elliot Axelband,
Ike Chang,
Dr. Paul Steinberg,
Dr. Carolyn Wong,
and Dr. Howell Yee

Introduction

In an effort to maintain its technological edge, the Army spent approximately $1 billion in FY96 in basic, exploratory development, and advanced development research. Despite this outlay of money, the Army is facing a series of constraints in maintaining its technological edge:

- Future reductions in science and technology (S&T) funding that have averaged 15 percent per year over the past few years;
- Commercial domination of many of the important technological areas for the Army, such as information technologies;
- Growth in international technology capabilities, and thus, in competition from European and Japanese companies; and
- A changing research climate within the government, with a growing ideological shift away from big government involvement in research and development.

At the request of the Principal Deputy for Technology, Army Materiel Command (AMC), we examined promising options for the Army to consider in conducting collaborative research with nontraditional suppliers (NTSs), defined as U.S. commercial companies that are accepted leaders in their technological fields and have not traditionally worked for the Army.

What Options Are Available For Collaborating With NTSs?

Figure 1 shows the evolution of the basic options available to the Army for collaboration with industry from 1955 to 1995. For most of the period shown, a standard procurement contract was the only available mechanism. Although not specifically designed as an instrument for conducting collaborative research, contracts can be used to execute collaborative efforts. In the 1980s, grants were added as another option, although grant recipients are usually limited to universities and nonprofit organizations performing basic research. As a result of the Federal Technology Transfer Act of 1986, federal laboratories were given the authority to establish Cooperative Research and Development Agreements (CRADAs) and Patent License Agreements (PLAs) with private companies, with the public, and with nonprofit organizations. (See Figure 1.)

In 1989, Congress authorized cooperative agreements (CAs) in Title 10 Section 2358 of the United States Code (10 U.S.C. §2358) for use by the military Services and the Defense Advanced Research Projects Agency (DARPA) as alternative mechanisms for conducting R&D. Finally, in 1989, Congress authorized other transactions (OTs) in 10 U.S.C. §2371, which includes the category of "other transactions." Since the enactment of Section 2371 in 1989, DARPA has interpreted and implemented OTs as transactions outside the financial assistance category.

Although DARPA has signed more than 100 OTs since 1990, the Services have not taken advantage of them. The Services have instead relied on "flexible" CAs as the preferred mechanism for dealing with dual-use and for-profit firms. This class of CA has become known as a "flexible" CA because latitude is given in crafting the instrument to make it as flexible as possible. However, as we will discuss next, there are certain legal limits on the flexibility of all CAs.

Table 1, which shows how the above options compare in terms of features, reveals that OTs are the most flexible option from the NTS' perspective. Below we discuss some of the more important features in more detail.

Starting with intellectual property rights, OTs and CRADAs are the only options that

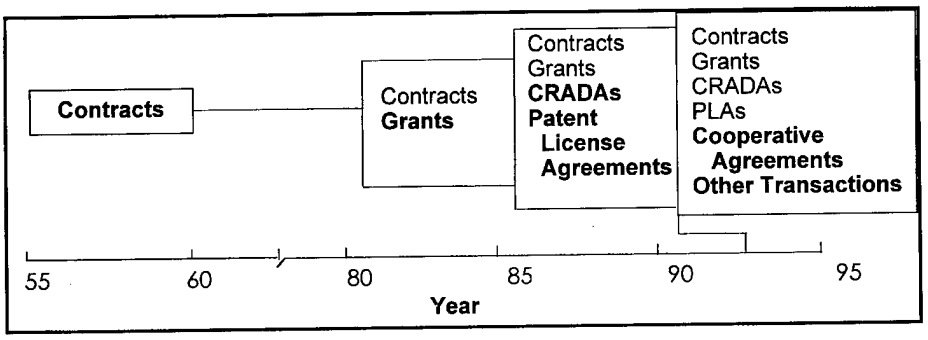


Figure 1.
Spectrum of options available for collaboration over time.

Table 1

Features and Options That Are Attractive To NTSs

Features \ Options	Contract	Grant	AMC CRADA	CA 10 USC 2358	OT
Intellectual property rights	Bayh-Dole	Bayh-Dole	Negotiable	Bayh-Dole	Negotiable
DoD regulations	FAR, DFARS	DoDGARs	AMC Pamphlet 27-1	DoDGARs	Minimal
Accounting system	Circular A-110	GAAP	Not applicable	GAAP	Commercial systems OK
Government involvement?	No	No	Yes	Yes	Negotiable
R&D phase	All	All	6.1–6.3[1]	All	6.1–6.3
Government's cost share	100%	100%	None[2]	No constraints	50% else approvals
Proposal required?	Yes (formal)	Yes (formal)	Yes	Yes	Yes
Proposal-to-award time	Not specified	Not specified	Not specified	Not specified	20 days[3]
Government ROI[4] allowed?	No	No	Royalties & reimbursements OK	No	Yes

Note: Foreign access is subject to all existing federal laws. Army may impose additional restrictions.

[1]Refers to basic (6.1), exploratory development (6.2), and advanced development (6.3) R&D.
[2]Government may provide in-kind support.
[3]Time period recommended by RAND.
[4]ROI means return on investment.

Favorable
Some concerns
Unfavorable

RAND P676-B.2-0996

make the issue negotiable; the other options require adherence to the Bayh-Dole legislation. The provisions of Bayh-Dole apply to all CAs, including "flexible" CAs. The Bayh-Dole provisions do not apply to OTs and CRADAs because these instruments are not financial assistance agreements. Other intellectual property considerations, such as technical data, computer software, and copyrights are negotiable in all contractual instruments. In terms of Department of Defense (DOD) regulations, OTs have minimal restrictions but the other options are subject to many stringent regulations, such as the Federal Acquisition Regulation (FAR) and the Defense Acquisition Regulation Supplement (DFARS) for contracts and the Department of Defense Grant and Agreement Regulations (DODGARs) for grants and CAs. In terms of accounting systems, OTs can use a commercial system which the contracting firm has in place, grants and CAs are permitted to use generally accepted accounting principles (GAAPs), and contracts are bound by the more stringent government accounting principles of Circular A-110.

The military departments have been granted OT authority for prototyping under Section 845 of the 1997 Defense Authorization Act. Unlike the OTs discussed above, Section 845 agreements eliminate the need for nonspecific R&D and cost sharing. Also, it is not necessary to ensure that a contract, grant, or cooperative agreement is infeasible or inappropriate.

How Willing Are NTSs To Work With The Army Using OTs?

While the above comparison shows that OTs should be useful in attracting NTSs, to confirm this we conducted our own analysis, based on interviews with knowledgeable personnel in several companies we considered good candidates for collaboration. We were also interested in knowing whether the other instruments would be adequate to attract NTSs. Therefore, as we discussed each instrument, we made it clear that we were discussing the most flexible provisions permitted under the law.

We selected information technology (IT) as a leading-edge technology area and chose 11 firms (shown anonymously in Table 2) as representative. The companies whose personnel we interviewed were small to medium size in terms of sales, with the smaller companies usually being specialized in terms of product lines. Annual sales and money spent on R&D were compiled from annual reports and *Business Week's* "R&D Scoreboard for 1995." The percentage of sales devoted to R&D ranged from a low of 4 percent (Company E) to a high of 25 percent (Company K), with the average amount spent on R&D being 14 percent of sales.

To form a consensus on key issues, we interviewed a diverse range of appropriate company officials, including a CEO/president; seven vice presidents (of operations, administration, or strategic planning); many directors or managers of product development, production, or government sales; and two general counsels. We presented each interviewee group with a consistent set of questions, covering administrative regulations, management oversight, cost-sharing, intellectual property rights, subcontractor relations, socioeconomic requirements, proposal solicitation, foreign access limitations, and personnel exchange agreements.

Based on the interviews, the companies unanimously said they would *not* do research with the Army with the current contractual instruments in place; i.e., contracts, CAs, CRDAs. Six said they would be interested if OTs were used (A, B, E, I, J, and K); however, all said they would have to better understand the ramifications of OTs. Four of the 11 companies said "maybe" (C, F, G, and H) if OTs were used, with three saying they might consider research with the Army on a case-by-case basis (C, G, and H), and one expressing serious doubts about the Army being willing to reduce the administrative load regardless of the instrument (F). Only one company said it was not interested in any case (D).

Despite the encouraging nature of the responses, the interviews did reveal some potential problems. For example, the companies noted they do not have large admin-

Table 2

Sales And R&D For Information Technology Companies Interviewed

IT Company/Product Line	Sales ($ million)	R&D ($ million)
A/Software shells	465	70
B/Semiconductors	775	105
C/Routers/smart hubs	385	40
D/Routers/smart hubs	600	60
E/Telecommunications	370	15
F/Semiconductors	545	125
G/Database design	470	70
H/Network diagnostics	115	15
I/Telecommunications/wireless	270	50
J/Low-power consumption chips	200	15
K/Software automation CAD/CAM/AI	200	50
Total	**4,395**	**615**

Note: Numbers have been rounded up or down.

istrative infrastructures in place to write proposals and are concerned with the big differences in product development time scale—years for the military vs. months for commercial firms. Intellectual property rights could also be a big stumbling block, unless OTs were used so that the rights, royalties, and licensing agreements could be negotiated flexibly with the government.

However, one potential problem emerged as a nonproblem. Cost-sharing was not viewed as limiting as long as there was a 50-50 split between industry and government – a finding similar to what DARPA experienced with its cost-sharing efforts.

The interviews also showed that while it is important to eliminate cumbersome regulations, this is not enough to attract NTSs. To improve its chances, the Army must aggressively "market" research programs to NTSs. This involves advertising in appropriate trade journals (e.g., *IEEE Spectrum*) for these companies and using their preferred telecommunication media (i.e., FAXs); knowing their market niches, technology interests, business concerns, and strategic goals; and communicating in a way they will understand and at forums they attend (e.g., trade shows like COMDEX).

In addition, the Army must establish an environment of trust and abide by all advertised promises, especially promised funding and start dates. To a commercial firm, time to market is critical. If anything slows or hinders this process, the firm views it as a potential loss in profit.

What Can The Army Do To Ensure Successful Collaborations?

Once the Army attracts appropriate NTS, it must ensure the resulting collaborations are successful. As part of our work for AMC, we have identified candidate organizations and technologies suitable for an NTS pilot program and have evaluated them. Table 3 shows the list of organizations and technology areas considered.

Regardless of which of these areas (if any) prove suitable for pilots, the Army can do three things to ensure it benefits in any pilot collaboration. First, it must align its technical objectives with the company's strategic goals to ensure that both sides can articulate their needs and visualize the desired end products and their intended applications.

Second, it must produce a formal business plan—including development plans, expected windows for technology insertion, and anticipated milestones—and use an initial version of it in the proposal selection process.

Finally, the Army should plan for success from the outset. This entails five actions: fencing off funding before formal solicitation begins; ensuring that the elapsed time from proposal solicitation to research start is short; ensuring that administrative oversight is minimal; making the Army's interest apparent by assigning top-notch personnel who are true believers; and keeping lines of communication clear and open.

Conclusions

Although OTs are promising options for conducting collaboration research with NTSs, the Services have, so far, not opted for them. OSD has acknowledged that OTs may be used when it is clear that "flexible" CAs will not achieve government objectives. Our survey of leading-edge IT firms suggests that OTs are needed to attract NTSs. A recent DOD study points out that "additional opportunities for research with commercial firms could be available if OTs were used." (See "The Services' Use of 10 U.S.C. 2371 'Other Transactions' and 845 Prototype Authorities," Final Report, DOD, 18 March 1996-10 June 1996.)

Fortunately, there are promising signs that AMC is beginning to explore the use of OTs. For example, the U.S. Army Simulation, Training and Instrumentation Command has recently solicited commercial companies, universities, or joint ventures interested in CAs and OTs to submit white papers. STRICOM is also preparing a pamphlet on CAs and OTs summarizing their requirements and features. (See "Cooperative Agreements and Other Transactions POC," *Commerce Business Daily,* February 15, 1996.) In addition, the Natick RDEC is proactively initiating communications with NTSs in the food and clothing and individual equipment areas and is exploring innovative collaborative arrangements using OTs. These examples are encouraging, but to continue to reach the most promising companies and realize gains, the Army must continue to move in this direction.

The authors work at the RAND Corporation in the Arroyo Center, a federally funded research and development center sponsored by the U.S. Army.

DR. KENNETH HORN is the Director of the Arroyo Center's Force Development and Technology Program. He holds a Ph.D. in aeronautics and astronautics from Stanford University.

DR. ELLIOT AXELBAND is a RAND consultant and Associate Dean, School of Engineering, University of Southern California. He holds a Ph.D. in engineering from the University of California at Los Angeles.

IKE CHANG, DR. PAUL STEINBERG, DR. CAROLYN WONG AND DR. HOWELL YEE are researchers within the Force Development and Technology Program. Chang holds an M.S. degree in electrical engineering from the Massachusetts Institute of Technology and is currently a doctoral candidate in the RAND Graduate School. Steinberg holds a Ph.D. in English from the University of California at Berkley. Wong holds a Ph.D. in electrical engineering (operations research) from the University of California at Los Angeles. Yee holds a Ph.D in chemistry from Cornell University.

Table 3

Candidate Organizations/Technologies Identified as Suitable for an NTS Pilot

Collaborative Technology	Army Organization	Specific Technology
Artificial intelligence	Director of Information Systems for Command, Control, Communications and Computers (DISC4)	Expert systems
Automotive	Tank-Automotive Research, Development, and Engineering Center (TARDEC)/National Automotive Center (NAC)	Vehicle technologies
Electronics/ C4	Army Research Laboratory (ARL)	Information warfare
Models/simulations	Simulation, Training, and Instrumentation Command (STRICOM)	Advanced simulators
Soldier support	Natick Research, Development, and Engineering Center (RDEC)	Food/CIE/ biotechnology

NOTE: C4 stands for command, control, communications and computers; CIE stands for clothing and individual equipment.

THE TANK EXTENDED RANGE MUNITION CONCEPT STUDY

By LTC John C. Woznick

Introduction

Force XXI operations present new paradigms for the employment of heavy maneuver forces. As implementation of Force XXI continues, the volume, accuracy and speed of information and targeting data available to commanders are developing. Improvements in target acquisition, such as advanced forward looking infrared sensors integrated in both tank and Scout platforms, provide a capacity to use tank munitions to the maximum range that the commander's situational awareness extends. This could significantly impact the ability to engage targets outside traditional close combat ranges.

Recognizing this as a logical development in armament research, a group of interested materiel development agencies came together to explore what might be an important new technical capability and to assess its worth to the Army. The purpose of this article is to explain the concept of a Tank Extended Range Munition (TERM). Further, the article will detail how the concept was examined to determine its technical feasibility and if it might support armor's role, which is to enhance the maneuver commander's capabilities in Force XXI operations. The initiative serves as a model for the development of innovative weapons concepts through creative teaming.

Study Mission Statement

By means of a team effort, involving appropriate RDEC's, PMs, ARL and the User evaluate, through analysis, and modeling, the technical feasibility, challenges and combat utility of equipping a tank with a cannon munition or missile with a long range precision guided capability digitally linked to the maneuver commander's situational awareness picture / battlespace.

The Concept

The TERM concept proposes to combine emerging technologies in digitization, target acquisition, and warheads with advanced vehicle and tank main armament design to provide an enhanced engagement capability to the armored force. The focus of the concept is to provide an offensively oriented close combat force with a lethal long-range engagement capability. This capability can engage either direct fire or "beyond line of sight" (BLOS) targets where the firing tank does not have intervisibility with the target. This "indirect" capability is analogous to the ability of attack helicopters to fire engagements initiated by Scout aircraft or other reconnaissance assets.

The concept would provide the tank with an extended range precision-guided munition (both missile- and projectile-based options were considered). Acquisition could occur by the combat vehicle itself or by another asset linked in its digital architecture. This would allow the tank to engage designated targets with the guided munition when beyond line of sight; engage with long-range guided direct fire when the tank achieves line of sight; and, finally, engage with conventional direct fire ammunition when required.

The capability would be integral to the close combat maneuver force, rather than a fire support asset. The organic relationship and the ability to pass digital target information provide essential system responsiveness.

The choice between target designation and munition terminal guidance offers different tradeoffs in cost, complexity and operational impacts. These issues are being evaluated as the TERM concept matures. Additionally, several possible kill mechanisms are being considered for the munition, including top attack tandem high explosive antitank (HEAT), kinetic energy (KE) penetrators, and explosively formed penetrator warheads. The design will be optimized to maximize probability of kill, given a shot P(k/s) on a 2015 threat tank with explosive reactive armor cassettes, active protection systems (APS), and top attack protection.

The Study

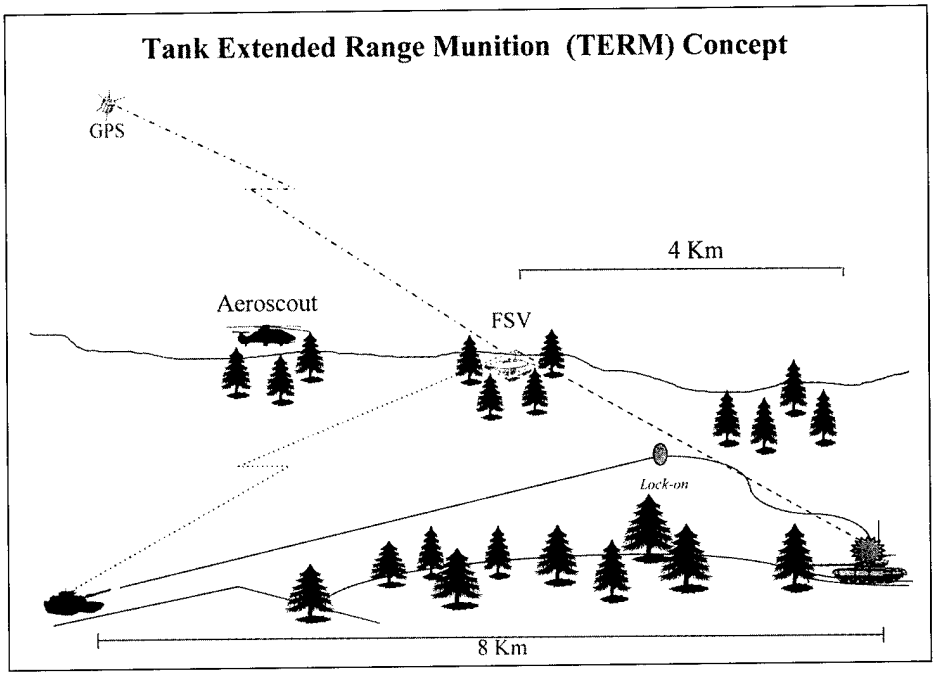
The leadership of the Tank-Automotive Research Development and Engineering Center (TARDEC), the Missile Research Development and Engineering Center (MRDEC), and the Armament Research Development and Engineering Center (ARDEC) recognized that technical developments in target acquisition and smart weapons might be applied to Abrams block improvements or future combat system developments to offer extended range and increased lethality to the warfighters in the armor force. A concept evaluation team was proposed to examine whether a TERM concept was technically feasible and if there was user interest, based upon possible payoffs.

Initial analysis of the concept by the U.S. Army Research Laboratory (ARL) indicated that a tank direct fire long-range engagement system would be limited because intervisibility to the target rarely extended beyond 4 to 5 kilometers. However, the analysis also indicated that providing target data from a helicopter or ground Scout sensor could significantly increase the frequency of long-range engagement. Recent developments in digital target hand-off on combat vehicles suggested that BLOS engagement would indeed be possible and was desirable for survivability of both the sensor and firing platform.

With these results, a study team was formed with members from TARDEC, the Training and Doctrine Command (TRADOC), ARDEC, MRDEC, ARL, and the Army Materiel Systems Analysis Activity (AMSAA). The study team would evaluate concepts, help assess the operational payoff and identify critical factors that must be considered in the design of a TERM system. The study team was responsible to a technical executive steering committee comprised of the Associate Technical Directors of the research, development and engineering centers (RDECs).

The Phase 1 TERM study considered seven concept alternatives provided by the ARDEC and MRDEC. These were:

- a tank-launched, precision-guided mortar round with a tandem warhead;
- a smart long-range missile with a tandem warhead;
- a smart top attack multi-purpose round with a unitary HEAT warhead;
- a guided smart top attack fire and forget round (flyover shootdown);
- an LOS only tank-launched KE missile;
- an LOS only guided KE round; and
- an LOS/BLOS KE munition (either missile or bullet).



The study group examined the impacts of a TERM-capable tank through both technical and operational analysis. The technical analysis evaluated the feasibility of the concepts and assessed design challenges. Data for candidate concepts were provided by the RDECs and then reviewed by the study team. The data were at various stages of maturity, with some concepts being well defined and others being based more loosely on analogous systems and system components. The study team acted as a clearinghouse, evaluating, challenging, comparing data inputs and finally, capturing the performance data in the best form possible for use in the combat models.

Both Modular Semi-Automated Forces (ModSAF) and Combined Arms and Support Task Force Evaluation Model (CASTFOREM) combat simulations were used to examine combat effectiveness and operational implications. The TRADOC Analysis Command (TRAC) performed the CASTFOREM analysis in conjunction with ARDEC and TARDEC, where the majority of runs were performed. ARL performed its own ModSAF experiment of a generic concept in parallel to provide technical and procedural inputs and a comparison of results. Scenarios were selected based on their acceptability to the user community and modified to include the TERM firing procedures. The CASTFOREM scenarios included both operations in Southwest Asia and Northeast Asia. The ModSAF scenarios were based upon the M1A2 initial operational test and evaluation scenarios run at Fort Hood, TX, and later modeled by AMSAA. Agreement on both technical and operational assumptions was critical and constituted a major element of the study. The team formulated surrogate firing platforms and Scouts on the basis of the developing requirements for these systems provided by the user. The threat description was developed in coordination with AMSAA and threat and user communities.

Study Results

The analysis disclosed several important findings. First, operational tempo, evaluated in the ModSAF simulations, appeared to be increased by TERM, allowing the battle to finish more quickly with dramatic increases in Scout survivability. Second, there appeared to be possible logistical savings in ammunition expenditure, which could make a TERM-equipped armor force more independent and flexi-

The Tank Extended Range Munition Concept study was an excellent example of anticipating the direction in which technology is moving and the cooperation of a team of materiel developers and users to answer an important technical challenge.

ble. Finally, TERM provided a significant operational payoff in increased combat effectiveness. This payoff was measured in both significant increases in lethality at extended range and a positive effect on survivability, reducing tank losses.

In the CASTFOREM results, the TERM concept's BLOS usefulness depended on the nature of the terrain in the scenarios, having a greater relative impact where the probability of LOS was rare. Where long-range line of sight exists, such as in the desert, TERM engagements were found more likely to be self designated. Where the terrain is more broken, BLOS engagement becomes the norm and had a greater payoff. The ability of the Scout to remain undetected, both through stealth and signature management, proved critical for the ability to perform BLOS engagements.

TERM effectiveness was also affected by threat APS. Concepts that were slower moving flyers or that had a shallow angle of attack were affected by APS. Design of counteractive protection systems or trajectory shaping could be used to minimize the effect of APS on these systems. Flyover-shootdown concepts or fast moving guided KE penetrators performed much better against likely threat APS systems.

The TERM concept, by offering a high probability of kill given a shot, also offered an opportunity to service more targets with a fewer number of rounds. TERM munitions were very efficient from the point of view of stowed loads and the amount of ammunition required to be transported. This could be critically important in a more amorphous, non-linear battlefield, enhancing the armor commander and his unit's ability to range more freely on the battlefield with a shorter logistics tail.

The TERM-equipped platform increased the force loss exchange ratio (total red losses to blue losses) over the baseline between 17 and 58 percent. The TERM-equipped tanks improved their system exchange ratio (red losses per blue tanks lost) 76 to 263 percent (depending on the specific concept and scenario used). These findings show a clear improvement in lethality over the base case. The blue tank exchange ratio for several concepts was better than 20 to 1. The use of TERM also impacted survivability, reducing blue tank losses between 11 and 34 percent. TERM also reduced the average number of rounds per kill by as much as a factor of four. The results of the study clearly indicate that TERM provides the promise of payoff in both operational effectiveness and operational suitability.

Conclusion

The study team presented the results of the analysis to the U.S. Army Armor Center and was directed to explore the concept further. The Armor Center directed that the target for development of the capability should be linked to the development and fielding of the Future Scout and Cavalry System (FSCS). The TERM capability in conjunction with the FSCS offers interesting new possibilities to expand and dominate the maneuver commander's battlespace. This effort offered an attractive capability that paralleled the user's maturing requirements and is now projected for development and demonstration.

The TERM concept study was an excellent example of anticipating the direction in which technology is moving and the cooperation of a team of materiel developers and users to answer an important technical challenge. The study group determined that the technologies required to develop a TERM munition were relatively mature and not high risk. With the help of the TRAC, the study team was also able to execute an experiment that provided an initial assessment of the concept's possible payoffs. The concept study suggested that an armor force equipped with TERM could increase the Force XXI armor commander's ability to control an expanded battlespace and conduct rapid offensive operations in depth per Force XXI doctrine.

> *"Technical improvements in maneuver weapons systems, such as advanced optics, increased ranges, and digital electronics, will have a dramatic impact on tactical battlespace. Army maneuver forces—operating at an operational tempo controlled by the commander within a given battlespace—will use an expanded array of weapons systems to engage enemy forces at greater distances with assured accuracy. Based on enhanced situational awareness the operating tempo of these forces will be such that they will be able to outpace any adversary in mounted warfighting environments."*
>
> **– TRADOC Pamphlet 525-5**

LTC JOHN WOZNICK is the Armor Technology Manager for the Army Research Laboratory. He holds a bachelor's degree in biology from the State University of New York at Geneseo. In addition, Woznick is a member of the Army Acquisition Corps and has completed the Defense Systems Management College's Program Manager's Course at Fort Belvoir, VA.

SCENE PROJECTION FOR HARDWARE-IN-THE-LOOP SIMULATION OF MISSILES GUIDED BY INFRARED TARGET IMAGES

By Alexander C. Jolly

Background

Image processing of the passive infrared (IR) emissions of targets has become a commonly used basis for the terminal homing guidance of tactical missiles of all types (e.g., short, medium, and long ranges, surface-to-air, surface-to-surface, air-to-air, exoatmospheric, and endoatmospheric). Examples are THAAD (Theater High Altitude Air Defense) and ARROW systems for countering tactical ballistic missiles, EFOG-M (Enhanced Fiber Optic Guided Missile) and JAVELIN for countering ground-based armored vehicles.

Because hardware-in-the-loop (HWIL) simulation in a laboratory environment is an extremely valuable tool in aiding development and test and evaluation processes of these missiles, a need has arisen to simulate and project realistic, dynamically varying target images in real-time into actual missile seekers. These images must include the dynamic effects of target and missile motion while the latter is responding to closed guidance-loop control commands during flyout to intercept of the target, which is possibly maneuvering. A further requirement is the inclusion in the projected scenes of IR countermeasures, such as flares and radiated signals intended to confuse the missile sensor.

Techniques for the projection of IR target scenes have received attention for a number of years. Early efforts, circa 1969, to project static images included methods based on silhouette pattern masking of blackbody emitters (described in "IR Emitting CRT," in *Imaging Sensors and Displays,* Proceedings of SPIE **765**, by G. A. Rusche), and another based on halftone images printed on photo-sensitive aluminum sheets clamped to a preheated steel surface.

The needs of HWIL simulations, mentioned above, were driving factors in further development, particularly of dynamic image projection, and resulted in various technologies being pursued, starting with the Bly Cell in 1979. The Bly Cell technology is described in "Passive Visible to Infrared Transducer for Dynamic Infrared Image Simulation," Optical Engineering 21, by V. T. Bly; and in "Flickerless Dynamic IR Scene Generation for Simulation Applications," in *Infrared Scene Simulation: Systems, Requirements, Calibration, Devices and Modeling,* Proceedings of SPIE **940**, by D.R. Snyder and W. Lee.

Liquid crystal light valve technology was applied to the IR spectral domain by Hughes Aircraft Company in the 1980s (discussed in "Liquid Crystal-based Visible-to-Infrared Dynamic Image Converter," Optical Engineering 24, by U. Effron, S. T. Wu, J. Grinberg, and L. D. Hess; and in "Visible-to-Infrared Image Converter using the Hughes Liquid Crystal Light Valve," in *Spatial Light Modulators and Applications II,* Proceedings of SPIE **825**, by M.S. Welkowsky, R.A. Forber, C.S. Wu, and M.S. Pedinoff) and an integrated circuit, thin film resistor array approach was taken by British Aerospace in the same timeframe (discussed in "Infrared Scene Displays and their use in Detector and Processor Assessment," Infrared Physics 27, by A. D. Hart, A. P. Pritchard, and S. P. Lake; and in "Electrically Heated Pixel Arrays for Dynamic Infrared Scene Generation," in *Infrared Scene Simulation: Systems, Requirements, Calibration, Devices and Modeling,* Proceedings of SPIE **940**, by A. P. Pritchard and S. P. Lake).

In the latter part of the 1980s and early 1990s, technologies based on spatial light modulation by deformable mirrors (described in "Optical Characteristics of a Deformable Mirroe Spatial Light Modulator," Optical Letters **13**, by D. A. Gregory, R. D. Juday, J. Sampsell, R. Gale,

R. W. Cohn, and S. E. Monroe Jr.) and IR laser diodes have been developed.

Additionally, the resistor array approach, mentioned above, has been extended to the use of suspended membranes as resistive elements in place of the thin film resistors located on insulating layers as in the initial designs. This use of suspended membranes as resistive elements is discussed in "Performance Characteristics of a 256x256 Suspended Resistor IR Scene Generator System," in *Characterization, Propagation, and Simulation of Sources and Backgrounds IV*, Proceedings of SPIE **2223**, by A. P. Pritchard, S. P. Lake, I. M. Sturland, M. D. Balmond, and D. W. Gough.

Practical use of the technologies described above has shown that there is no one single method of IR scene projection which stands out as being superior to all others. Present development efforts center around projectors based on scanning laser diodes and suspended membrane resistive arrays. The application of scanning laser diodes to IR scene projection was pioneered at the U.S. Army Aviation and Missile Command as a low cost alternative to the suspended membrane resistive element integrated circuit approach. This article describes the scanning laser diode technology and the present state of its development.

IR Scanning Laser Diode Array Projector

The basis of this projector is a linear array of lead-salt laser diodes that have been manufactured to emit radiation at a specific wavelength in either the mid- or long-wave bands of the IR spectrum. The laser beams are scanned in a direction perpendicular to the linear array by means of a rotating polygonal mirror to illuminate an area occupied by a rectangular array of IR detectors (usually called a focal plane array or FPA). Coupling optics are used at the laser output and after the scanning mirrors to tailor the projected image to the required fields-of-view of the FPA-based IR sensor. The intensity of each laser beam is modulated during the scanning action to produce the intended image on the FPA (the image to be projected is generated by a real-time target image computer). A set of drive electronics, one channel per laser, converts the calculated target image and background IR radiance to laser modulation current. The IR projector is shown in block diagram form in Figure 1. The label TDL Array, which stands for "tuneable laser diodes," indicates the lasers located in a housing cooled to cryogenic temperatures (below 77 K). A signal line labeled 'X-sync' is shown linking the seeker unit under test (UUT) with the laser drive electronics. This signal is necessary to synchronize the scanning input images with the FPA readout electronics such that image readout of the FPA to the image processing electronics in the missile seeker occurs exactly at the end of an input scan and laser modulation is correctly synchronized with illumination of each column of detectors in the FPA. (See Figure 1.)

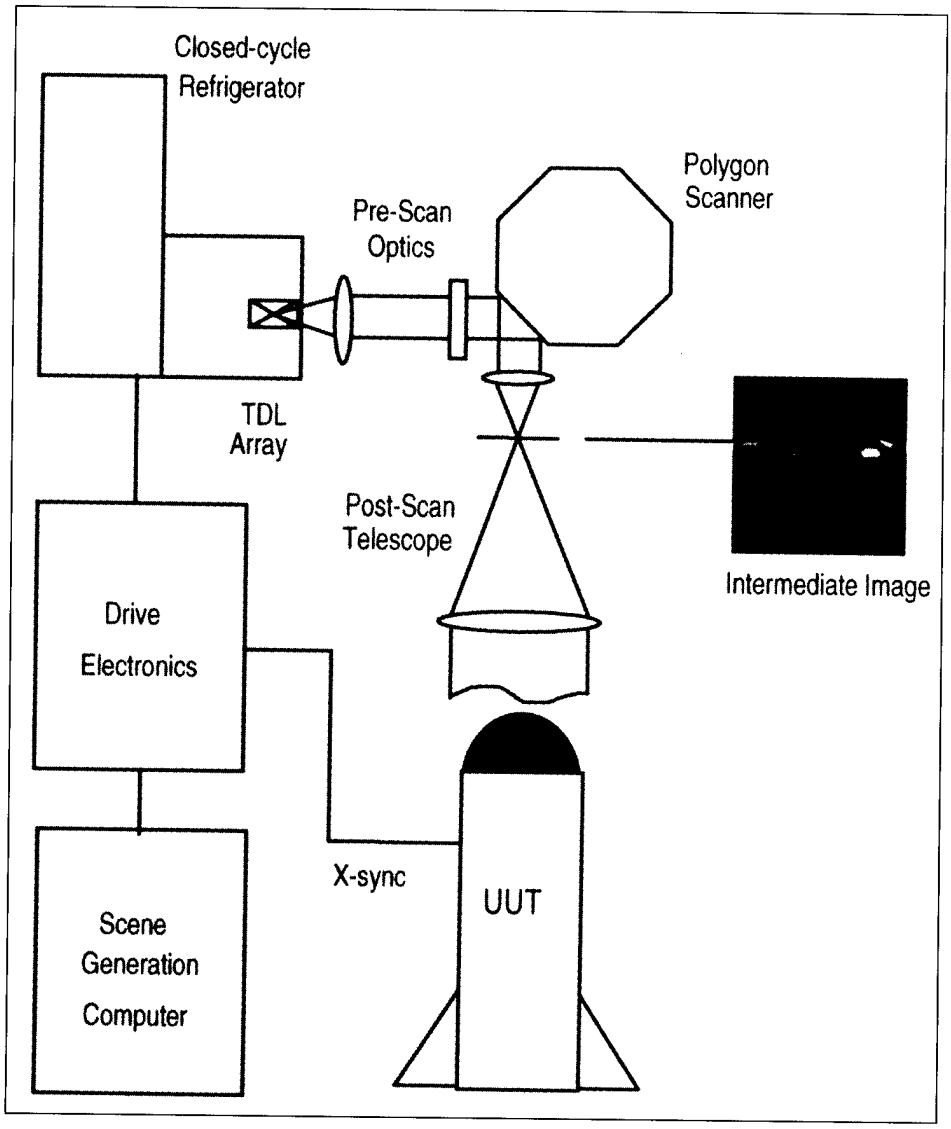


Figure 1.
Laser diode infrared projector schematic.

Performance figures for the initial implementation of the laser diode IR image projector are given in Figure 2. From the entries in the table, it can be seen that the projector has 64 laser diodes emitting at a wavelength of 4.7 microns and uses a 4:1 interlacing scheme. These characteristics permit the projector to illuminate a mid-waveband IR FPA of size 256x256 elements at a rate of 4,000 image frames per second. Illumination of larger size FPA sensors can be achieved by either increasing the number of lasers or increasing the interlacing ratio. The choice depends on tradeoffs among parameters, such as effective maximum temperature required, FPA readout frame rates, and fields-of-view required. Long-waveband IR (LWIR) FPAs can be accommodated by changing to appropriate LWIR lasers in the projector. Each laser is individually replaceable in a custom-designed mounting frame so that failure of a single laser does not require replacement of the total array.

Because each laser has a unique, nonlinear relationship between control current input and the resulting IR signal intensity output, and because the scanning action

of the polygonal mirror introduces non-uniformity of the illumination intensity received by each column of FPA elements, calibration and corrections of the spatial non-uniformity in the projected scene is a very important aspect of the projector design and implementation. Calibration, linearization, and Non-Uniformity Correction (NUC) parameters are generated by special purpose software which executes on a personal computer connected to the interface included with the drive electronics. A calibrated IR camera is used to measure the projector output. Correction data tables are stored in digital memory associated with each laser drive electronics channel. Laser intensity modulation signals are corrected for each scan position on each frame in real time. Figure 2 indicates that NUC has currently achieved a better than 97 percent spatial uniformity and requires 90 minutes to calculate linearization and NUC parameters. After laser linearization and NUC have been applied, the frame is received by the IR camera, converted to gray scale for viewing purposes, and stored as a digital image. The input image is entirely generated by computer from geometric models of the vehicles, IR emission data for the vehicles, and background terrain IR emission data obtained by field measurements.

Future Developments

Use of the scanning laser diode IR projector in existing HWIL simulations has clearly demonstrated the value and capabilities of this technology. A version of the projector is being produced for operation at LWIR and the electronics have been improved based on earlier laser linearization and NUC experience. The next generation projector will provide the capability to illuminate FPAs having sizes of 512x512 and 640x480 detector elements, which are sensor sizes for other Army guided missiles currently under development. The present configuration of the projector requires it to be mounted on a fixed-base optical table, which thereby mandates a fixed missile-target line-of-sight direction during the course of a closed guidance-loop simulation. This in turn forces the use of synthetic line-of-sight control during the simulation. For more complete simulation fidelity, it is desirable to allow real-world line-of-sight angles to be experienced by the missile sensor and, therefore, the IR projector output beam needs to be able to move in angle space relative to the sensor. Doing this in a cost-effective manner is the next challenge in the development of the laser diode IR projector.

Performance Parameter	Value
Spatial Resolution	256x256
Number of lasers	64
Field of View	11.1 deg
Emission wavelength	4.7 microns
Field Rate	16 KHz
Frame Rate	4 KHz
Maximum Apparent Temperature	>290 C
Minimum Apparent Temperature	6 C (limited by stray radiation)
Dynamic Range	>257:1
Minimum Perceptible Temperature Difference (1 bit)	0.05 K @30K background
Amplitude Resolution (uncorrected)	16 bits
Amplitude Resolution (corrected)	12 bits
Corrected Spatial Uniformity	97%
Calibration/correction time	90 minutes

Figure 2.

Conclusion

The design and performance of a scanning laser diode IR scene projector suitable for use in HWIL simulation of tactical guided missiles and submunitions has been briefly summarized. A linearization and non-uniformity correction process has been designed and implemented, and successful applications of the projector have been demonstrated. Development of the projector and applications to larger size IR detector arrays are continuing. The capability of generating real-world target line-of-sight angular changes by providing physical translational motion of the projected dynamic output images is a future requirement.

ALEXANDER C. JOLLY is Chief of the Hardware-in-the-Loop Simulations Functional Area in the Systems Simulation and Development Directorate, Missile Research, Development, and Engineering Center, U.S. Army Aviation and Missile Command (AMCOM). He holds bachelor's and master's degrees in mechanical and aerospace engineering, respectively, from educational institutions in the United Kingdom (UK). He is a member of the Army Acquisition Corps and a Chartered Engineer by the Engineering Institutions Council, London, UK.

MARKETING THE ARMY ACQUISITION CORPS TO JUNIOR OFFICERS AND CADETS

By Cadets Darren C. Hicks and Daniel C. Gibson

Marketing the Acquisition Corps provides a service to both the AAC and junior officers in that it recruits quality officers into the corps while at the same time, providing junior officers with the information to properly plan their future.

Editor's Note: The following article was written by two senior Reserve Officer Training Corps (ROTC) cadets while serving at the Pentagon this past summer as participants in the third annual ROTC Cadet Intern Program. Darren C. Hicks and Daniel C. Gibson were among a select group of 22 cadets assigned to the Army Secretariat, the Department of the Army Staff, and to other organizations within the Military District of Washington. The cadets represented numerous colleges and universities throughout the United States.

Established in 1995, the Cadet Intern Program is designed to help "future Army leaders" understand Department of the Army and Department of Defense policy issues, missions, and organizational relationships. Emphasis is placed on the role of the military Services – particularly the Army – in the national security policy process.

Introduction

The purpose of this article is to market strategies to inform junior officers and cadets about the Army Acquisition Corps (AAC). The AAC is unique because it requires officers who are highly skilled in technical fields. The AAC must spread information on a continuous basis. This is very important because junior officers and cadets are eager to learn and know everything about the Army. Today's lifestyle is computerized and technical. This gives the AAC an advantage over other specialty areas.

The most important weapon system in the U.S. Army is the individual soldier. Today's AAC aids the modern soldier on the battlefield by executing the AAC vision of "developing, integrating, acquiring, and fielding [weapon] systems" that will ensure their ultimate victory. To support this vision, the AAC is in need of highly trained, educated, and motivated young Army officers who are dedicated to serving the needs of the Army.

It should be a goal of the AAC to identify and track junior officers with skills and traits useful to the AAC and recruit them into the corps. To do this, senior ROTC and U.S. Military Academy (USMA) cadets must be informed of the opportunities that exist in the AAC and be kept notified of the changes and developments during their career progression.

Marketing Strategies

There are several ways to market the AAC: expand current internship programs; create professional displays; conduct an AAC briefing during branch orientations; produce information videos; send information packets to junior officers and cadets with technical degrees; and develop hyperlinks to ROTC, USMA, and other home pages.

Getting Started

The first step is to begin coordination for expanding the current Cadet Intern Program to include an internship at one of the Army's research labs. This will give cadets hands-on experience and provide them opportunity for practical applications of their studies. In the past, coordination of internship programs has taken upwards of eight months to complete. For a program to be in place for the summer of 1998, coordination began in September 1997 and will be completed by May 1998. This will allow 1998 graduates of Advanced Camp to attend immediately upon completing their training.

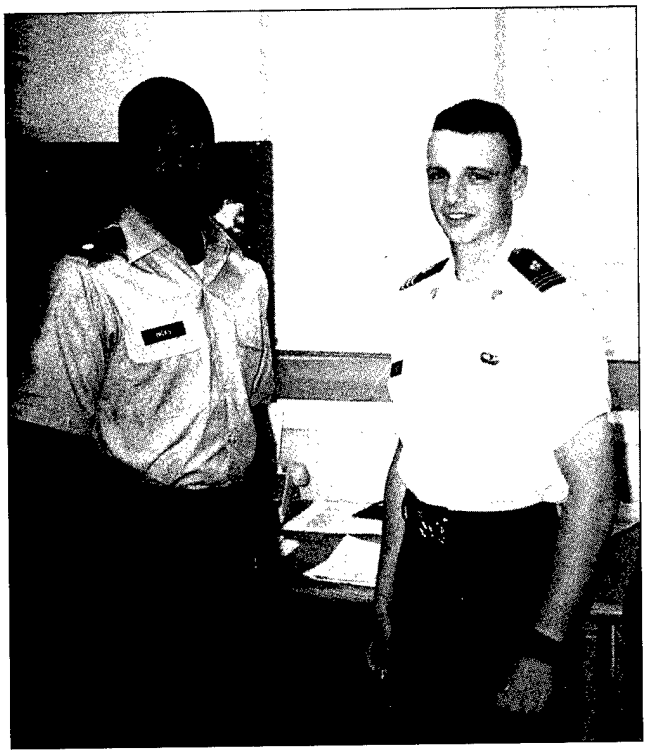
The next step is to create professional displays for use at Army professional organization conferences to be held in FY 98. These include the Association of the U.S. Army, Army Aviation Association of America, and the Society of American Military Engineers. These professional organizations target junior officers who are in technical fields, thus reaching a large portion of the AAC target audience.

Following the creation of professional displays, the next step is to hold an AAC briefing during branch orientations at ROTC Advanced Camp. Likewise, hold an AAC briefing during a selected visit to the USMA. This will ensure that all cadets will be introduced to the AAC prior to being commissioned. In addition, it enables AAC representatives to talk firsthand with cadets who are pursuing degrees in areas that will support the Acquisition Corps. Further, a mailing list can be constructed so the AAC can easily contact up-and-coming lieutenants and provide them information on the changes and developments in the acquisition field.

Using Video To Market

A tool that would prove invaluable at branch orientation briefings and could easily be sent to individual cadets as part of an information packet would be an informative video. The video should describe the AAC, demonstrate current Acquisition Corps research and development (R&D) projects, and profile AAC officers. The description of the AAC should include officer career progression, educational opportunities, and available job opportunities. The R&D aspect would illustrate the technology used in Force XXI projects. The final aspect of the video would present interviews with AAC officers. The interview would detail the officer's education, career progression, current job, and future career goals.

In addition to being used in a variety of displays, the information video could be sent to interested cadets and lieutenants as part of a larger information packet.



Shown (left to right) during their summer internship at the Pentagon are ROTC senior cadets Darren C. Hicks and Daniel C. Gibson.

Along with the video, the packet would contain a cover letter, a copy of *Army RD&A* magazine, general literature on the AAC, the civilian and military playbooks, a listing of AAC points of contacts, and a copy of DA PAM 600-3 *(Commissioned Officer Development And Career Management)*, chapter 47 (Introduction To The Army Acquisition Corps). The cover letter would be signed by Keith Charles, Deputy Director of the Army Acquisition Corps, welcoming the individual's interest in the AAC and offering to have a local representative of the AAC speak to interested ROTC units or organizations. The copy of *Army RD&A* magazine would include an offer to subscribe to the magazine. This subscription would keep the individual updated on the AAC.

Constructing hyperlinks from the AAC web page to both the ROTC and USMA home pages is very important. This will keep the flow of information to junior officers and cadets continuous and at the individual's own pace.

The final step is to investigate the possibility of providing a scholarship for advanced civil schooling to target cadets. Similar to the Competitive Development Group Program, this scholarship would provide selected cadets with technical degrees an opportunity to attend school on an educational delay of active duty.

Conclusion

Approximately seven years pass from the time that an Army officer is commissioned to the point at which he or she chooses a functional area. In the past, when officers have not been properly informed of their career opportunities following their company command, this span of time was not used most efficiently. In the future, properly informed cadets and lieutenants will be able to use this time to effectively plan their education and career progression and make more sound career decisions. Marketing the Acquisition Corps provides a service to both the AAC and junior officers in that it recruits quality officers into the corps while at the same time, providing junior officers with the information to properly plan their future.

If the strategy above is implemented, the information would be guaranteed to reach all target officers and cadets. This strategy is designed to keep targeted individuals current with AAC programs and initiatives during their career progression.

CADET DARREN C. HICKS attends Wake Forest University, Winston-Salem, NC, majoring in medical technology.

CADET DANIEL C. GIBSON attends Virginia Military Institute (VMI), Lexington, VA, majoring in mechanical engineering.

From The Director, Acquisition Career Management Office (ACMO)

By the time you receive this issue, the Acquisition Career Management Workshop may be in full swing or about to begin in San Antonio, TX. This year's workshop will be attended by members of the Army acquisition community as well as representatives from the Navy, Air Force, and Office of the Secretary of Defense acquisition communities. This very important workshop brings many members of the acquisition community together, with the hope that elicited ideas can be addressed and implemented across the Acquisition Workforce. The next issue of *Army RD&A* magazine will contain an article summarizing the accomplishments of the workshop.

Over the last month, my staff and I have visited several installations to present update briefs to the Army Acquisition Corps (AAC) and Workforce (AAW). These visits continue to provide us with excellent input from the field, which is crucial to our efforts to evaluate our current initiatives, develop new initiatives and gain ideas for future programs and improvements. We appreciate your attendance at these briefings, and hope that the associated sensing sessions provide you with additional opportunity for small group discussion of acquisition career management issues. Our quest for two-way communication is served well by these visits to the field. In the future, we will expand the size of the team to provide additional customer support.

We also visited the National Training Center. We are pursuing the opportunity for both military and civilian personnel to benefit from the offerings of this wonderful facility. Look for more information in the near future, which will allow AAC members the opportunity to see our Army in a realistic training environment.

Congratulations to COL Jim Cross, COL Steve Kee, and LTC Bruce Jette, winners of the Project and Product Manager of the Year Awards, profiled in this issue. These well-deserving individuals received their awards at the 1997 Army Acquisition Workshop in Orlando, FL, in August. Also recognized at the workshop was Keith Charles, Deputy Director, Acquisition Career Management. Congratulations to him for the well-deserved Meritorious Civilian Service Award for his leadership, drive and determination, which resulted in many accomplishments and new initiatives in the acquisition career management arena. Attendees felt the workshop was a huge success, and details of the workshop are presented in this issue on pages 13-17.

I strongly encourage all of you to submit articles to *Army RD&A* magazine, and to the many other military and professional publications read by members of the various Services and branches and the acquisition community. The AAW has many excellent anecdotes and experience that can benefit the entire Army. We are all better served by sharing this information.

Last, but by no means least, if you are a GS-13 or below, and have not received an Acquisition Civilian Record Brief (ACRB) in your birth month since May 1997, please e-mail your correct address to ACRB@Radford-emh1.army.mil. If your birth month has not passed and you are not sure your address is current, send it to the same address! If you are an AAC member, a functional acquisition specialist (FAS) will contact you to update your ACRB.

I hope that many of you had the pleasure of visiting the AAC exhibit at the annual meeting of the Association of the U.S. Army in October. Read the article about the exhibit in this section, and remember the slogan "Facing the Future. . .Together." The AAC and the warfighter are indeed contributing together to ensure the success of tomorrow's Army.

As always, I invite you to send me your thoughts and ideas on how we are doing and what we can improve. You can contact me or any one of my personnel (see the accompanying ACMO staff list).

COL Thomas V. Rosner
Director, Acquisition Career Management Office
Pentagon, 3E427
rosnert@sarda.army.mil
(703) 697-6291 (DSN 227)

ACMO Staff And Proponency Officers

Staff and Proponency Officers	Commercial (703)	DSN	E-mail Address
COL Tom Rosner, Director	697-6291	227-6291	rosnert@sarda.army.mil
Mary Thomas, Deputy Director	693-7323	223-7323	thomasm@sarda.army.mil
LTC(P) Bill Fast, Special Projects	695-7264	225-7264	fastw@sarda.army.mil
Karen Walker, Program Mgmt BCE&FM	697-2542	227-2542	walkerk@sarda.army.mil
MAJ Yancey Williams, Program Mgmt	697-0472	227-0472	williamy@sarda.army.mil
MAJ Mike Bonheim, Contracting	695-7265	225-7265	bonheimm@sarda.army.mil
Mary McHale, Contracting; Ind Prop Mgmt	697-6293	227-6293	mchalem@sarda.army.mil
LTC Earl Rasmussen, Comm/Computer	695-7264	225-7264	rasmusse@sarda.army.mil
Tony Echols, Logistics, Manu & Production	697-2558	227-2558	echolsa@sarda.army.mil
Peggy Mattei, Systems Planning RD&E, T&E	697-4382	227-4382	matteip@sarda.army.mil

Bonheim Joins Acquisition Career Management Office

The Army Acquisition Career Management Office, Office of the Assistant Secretary of the Army (Research, Development and Acquisition), is pleased to announce the arrival of MAJ(P) Mike Bonheim, who will serve as the Functional Area 97 (Contracting and Industrial Management) Proponency Officer. Bonheim served previously as Contracting Officer, Aviation Applied Technology Directorate, U.S. Army Aviation Troop Command. He has also served as Deputy Chief, Contracting and Administrative Contracting Officer, Defense Plant Representative, Honeywell/Alliant Techsystems. Bonheim holds an M.S. in acquisition management from the Naval Postgraduate School, is a graduate of the Command and General Staff College, and a recent graduate of the Advanced Program Managers Course.

Army Acquisition Corps Display

The Army Acquisition Corps (AAC) exhibit, "Facing the Future Together," was displayed at the Association of the U.S. Army's annual meeting held Oct.13-15, 1997, in Washington, DC.

The display wall depicts a soldier, which is actually composed of hundreds of photographs of Army Acquisition Workforce members. The display wall also houses an interactive video, including an introduction by and interview excerpts from LTG Paul Kern, Director of the AAC and Military Deputy to the Army Acquisition Executive. The interactive video uses computer touch screen technology to highlight several successful systems from the Advanced Warfighting Experiment, which are described by the soldiers who used them.

The display serves the overall purpose of publicizing the value and importance of the AAC in providing soldiers the systems that are critical to decisive victory now and in the 21st century. The display will also be exhibited at commands and conferences throughout the coming year.

Army Acquisition Tuition Assistance Program

The Army Acquisition Tuition Assistance Program (ATAP) is available to civilian members of the Army Acquisition Corps (AAC) and the Army Acquisition Workforce (AAW). Included in the AAW are members of the Corps Eligible (CE) Program and the Competitive Development Group (CDG). ATAP was announced as "open continuous" on July 16, 1993, and will be in effect until Sept. 30, 2001. There are currently 729 ATAP students Armywide. The educational program is managed by the Army Acquisition Education and Training (AET) Office.

ATAP enables individuals to satisfy their educational requirements and enhance their career development, as cited in the DoD 5000.52M, *Acquisition Career Development Program.* Master's, bachelor's and associate degrees may be pursued. Individuals may also use the ATAP to satisfy their required 12/24 hours in business. AAC, AAW, CE and CDG members are eligible for bachelor's degrees; AAC, CE and CDG members are eligible for master's degrees. Degrees must be in a discipline that underpins acquisition functions, such as accounting, business finance, law, contracts, purchasing, economics, marketing, industrial management, organization and management, quantitative methods, and technical and scientific specialties.

ATAP funding only covers tuition, lab fees and special assessment fees. Students in master's degree programs must receive grades of "B" or better. Students seeking bachelor's degrees, associate degrees, or those in 12/24 hours programs must receive grades of "C" or better. The government must be reimbursed for the cost of the class if these grades are not achieved.

Application forms for the ATAP may be obtained from the *Army Acquisition Corps Army Acquisition Workforce Civilian Training Opportunities Academic Year 1997-1998* catalog, available at civilian personnel offices. The catalog is also on the Internet at: http://dacm.sarda.army.mil. The suspense dates are June 1 and Oct. 1 of each fiscal year. Applications will also be accepted out-of-cycle on a case-by-case basis, but must be accompanied by a justification and a request for out-of-cycle consideration. All applications must be submitted through the applicant's training coordinator to the Acquisition Career Management Office, Acquisition Education and Training division (AET). Individuals who do not have a training coordinator may submit their applications directly to the AET Office at 9900 Belvoir Road, Suite 101, Fort Belvoir, VA 22060-5567. Representatives from the respective career fields board the applications. Final selections are made by the Deputy Director for Acquisition Career Management and are announced by AET. For more information on ATAP, contact Sue Winkler at commercial (703)805-1048 or DSN 655-1048.

PERSCOM Notes. . .

Senior Service College Results Released

The Senior Service College (SSC) Selection Board selected the following 30 Army Acquisition Corps members to attend the SSC during academic year 1998-1999:

LTC Charles R. Ball	LTC Gabriel F. Leyva
LTC William D. Beatty	LTC Thomas W. Light
LTC Robert P. Birmingham	LTC Jody A. Maxwell
LTC Joseph M. Brito	LTC Tim R. McKaig
LTC Robert M. Brown	LTC Georgy S. Miller
LTC Thomas M. Cole	LTC James C. Naudain
LTC Lauren S. Davis	LTC George B. Patten
LTC Mary Fuller	LTC Steven R. Perry
LTC John L. Gross	LTC Frank S. Petty
LTC Michael A. Hamilton	LTC Valerie A. Rasmussen
LTC Ronald R. Heuler	LTC Robert L. Reyenga
LTC Theodore E. Johnson	LTC Luis D. Sans
LTC William R. Johnson Jr.	LTC Charles R. Stevens
LTC Donald P. Kotchman	LTC John P. Weinzettle
LTC Kim C. Leach	LTC Karl A. Wickizer

The Army Acquisition Corps had a total of 443 officers eligible for selection to SSC and had a selection rate of 6.7 percent, which was equal to the Army average.

The following chart represents Year Group and Functional Area (FA) of the officers selected:

Year Group	FA51	FA53	FA97
1976	2	1	
1977	7	1	1
1978	8	1	4
1979	2	2	1

Nineteen FA51 offices were selected to attend SSC; five FA53 officers; and six FA97 officers. Each of the officers selected to

attend at SSC was a former centrally selected Command Designated Position List (CDPL) product manager or acquisition commander or is a current product manager or acquisition commander. This common experience among the selectees confirms what PERSCOM has stated previously—the path to SSC selection includes a successful CDPL product manager or acquisition command tour.

Each officer selected for SSC will have the opportunity to inform the Chief, Military Acquisition Management Branch as to which SSC they would like to attend. Each officer will receive a memo with course descriptions of each SSC and fellowship that is available.

Advanced Civil Schooling Program

The Army's Advanced Civil Schooling (ACS) Program provides opportunities for officers to pursue advanced degrees at civilian schools on a full-time, fully funded basis. During FY98, the Army Acquisition Corps (AAC) has a total of 65 spaces available for ACS.

Prerequisites

AAC officers interested in applying for ACS should meet the following program requirements:

- A strong military file and potential for promotion;
- No more than 17 years active federal service upon start of the ACS Program;
- An undergraduate grade point average of at least 2.5; and
- A GMAT score of 500 or higher, or a GRE score of 500 or higher in each of the three categories. The GMAT or GRE scores must not be more than five years old.

Selection Of Graduate Schools

All graduate schools considered for ACS must be accredited universities, and the tuition for a full year of study (fall, spring, and summer semesters) should not exceed $14,500. The goal for the fully funded graduate program is to obtain "the best education in the shortest amount of time."

How To Apply

An ACS application packet consists of:

- DA Form 1618-R (with original signatures from the applicant and the first field grade officer in the applicant's chain of command). The form is located in AR 621-1.
- An original copy of all college transcripts.
- A letter of acceptance from each university listed on the DA Form 1618-R, except for Naval Postgraduate School (NPS). PERSCOM nominates officers to NPS and obtains this letter of acceptance. Letters of acceptance should include:
  - The title of the degree program to be pursued;
  - The day, month and year of registration;
  - The day, month, and year school begins;
  - The month and year the degree will be completed;
  - The cost per credit per semester/quarter; and
  - Whether in-state or out-of-state tuition will be granted.

If you meet the prerequisites and have discussed ACS possibilities with your assignment officer, mail an ACS application packet to: U.S. Total Army Personnel Command, ATTN: TAPC-OPB-E (AAC ACS Manager), 200 Stovall Street, Alexandria, VA 22332-0411.

Selection Process

The AAC holds a review board each January and July to select officers to attend ACS. The January board looks at applicants who would start ACS in the summer/fall semesters. The July board considers applicants who would start with the spring semester. The next board dates are Jan. 12-14, 1998, and July 15-17, 1998.

For additional information on the Army Acquisition Corps' ACS Program or application procedures, contact Paula Bettes, commercial (703)325-2760, DSN 221-2760, or e-mail: bettesp@hoffman-emh1.army.mil.

Training With Industry Program

The Training With Industry (TWI) Program is designed to provide military officers with hands-on experience in specific industry environments. TWI participants interact with industry personnel in a variety of industry programs, projects and/or training sessions.

All TWI positions start prior to Oct. 1 of the selection year and will not exceed one year in length. Our current plans are to place 10 Acquisition Corps officers in TWI positions during FY98 (from the industry listing below).

FY98 AAC TWI LISTING

Industry	Location
Alliant Techsystems, Inc.	Edina, MN
Allison Transmission	Indianapolis, IN
Bell Helicopter Textron	Fort Worth, TX
Boeing Defense & Space Group	Seattle, WA
DynCorp	Reston, VA
General Dynamics Land Systems	Warren, MI
General Motors Military Vehicles	Rochester Hills, MI
Hughes Aircraft	Tucson, AZ
Lockheed Martin Electronic Missiles	Orlando, FL
Lockheed Martin Vought Systems	Dallas, TX
Motorola Space & Sys Tech Group	Scottsdale, AZ
Oshkosh Truck Corporation	Oshkosh, WI
Raytheon Company	Sudbury, MA
Raytheon TI Systems	Lewisville, TX
Boeing (formerly Rockwell International)	Duluth, GA

How To Apply

Army Acquisition Corps officers must meet the same prerequisites as discussed in the ACS article above (except for the GRE/GMAT requirement). The January ACS Review Board also selects officers to be nominated to the TWI positions.

The TWI application consists of:

- DA Form 1618-R (Application for Detail as Student Officer at a Civilian Educational Institution); and
- A personal resume (no longer than two typed pages).

The DA Form 1618-R and resume should be mailed to: U.S. Total Army Personnel Command, ATTN: TAPC-OPB-E (AAC TWI Manager), 200 Stovall Street, Alexandria, VA 22332-0411.

For information on these positions or application procedures, contact Paula Bettes at commercial (703)325-2760, DSN 221-2760 or e-mail: bettesp@hoffman-emh1.army.mil.

NEWS BRIEFS

TECOM, ARL Research Virtual Proving Ground

Army researchers are developing a new computer-based test and evaluation system for proposed and existing equipment, which will shorten the acquisition process and significantly cut costs. Called the Virtual Proving Ground (VPG), the program is an Army Test and Evaluation Command (TECOM) effort supported by the Army Research Laboratory (ARL).

"The Virtual Proving Ground is a new way of doing business for the test and evaluation community. It will rely on computers as much as possible to evaluate equipment in addition to validating the methods the Army uses to conduct test and evaluation," says Ken Smith, a computer scientist with ARL's Information Sciences and Technology Directorate.

The VPG will allow high fidelity models of existing and proposed or prototype hardware to be tested without the need for as many expensive field tests of actual equipment. By performing these tests in a simulated environment, the development life cycle of equipment can be shortened by finding and fixing problems in the initial design. Also, equipment can be tested under conditions that cannot be replicated in the field, at the extremes of a model's performance. "It's all right to roll a tank in a simulation, but you want to avoid doing that in the field with an actual prototype," notes Smith. He adds that the VPG is not intended to replace field testing, but to augment it by improving the tests.

Another advantage of the VPG will be its ability to model subcomponents of systems. This will permit joining subcomponents from different systems together on a computer--such as a gun system from one vehicle with the chassis from another--to see if such combinations work.

Under development at TECOM's Aberdeen Test Center, the VPG is expected to be operational by the year 2003.

CONFERENCES

21st Army Science Conference

Conference Overview

The 21st Army Science Conference, sponsored by the Assistant Secretary of the Army (Research, Development and Acquisition), will be held at the Norfolk Waterside Marriott and Convention Center in Norfolk, VA, June 15-18, 1998. The conference theme is "Science and Technology for Army After Next." This biennial event began in 1957 to provide a forum for presentation, discussion and recognition of significant accomplishments by U.S. Army scientists and engineers.

The conference will feature presentations of approximately 150 papers and posters judged as best among those submitted. Authors of the most outstanding papers will receive special recognition and awards.

Objectives

Some of the conference objectives are:

- To discuss the latest developments in emerging technologies and their impacts on warfighting capabilities for Army After Next;
- To present the Army's best research to the international scientific and engineering community for critical review and discussion; and
- To provide a forum for sharing ideas related to the Army's many scientific and engineering disciplines.

Who Should Attend?

Defense and U.S. Army personnel; representatives from academia, industry, and other U.S. government agencies; officials from allied nations; and all those involved with new scientific initiatives and ongoing modernization activities focused on near-term and long-range U.S. Army combat capabilities are encouraged to attend.

Call For Papers

Department of the Army civilian and military scientists and engineers are invited to submit **unclassified,** two-page summaries that describe the relevance and contents of their proposed paper. Material must represent original work performed by Army civilian or military scientists and engineers. Army authors may submit papers in collaboration with colleagues in other agencies, academia or industry; however, **only Army personnel may make presentations.**

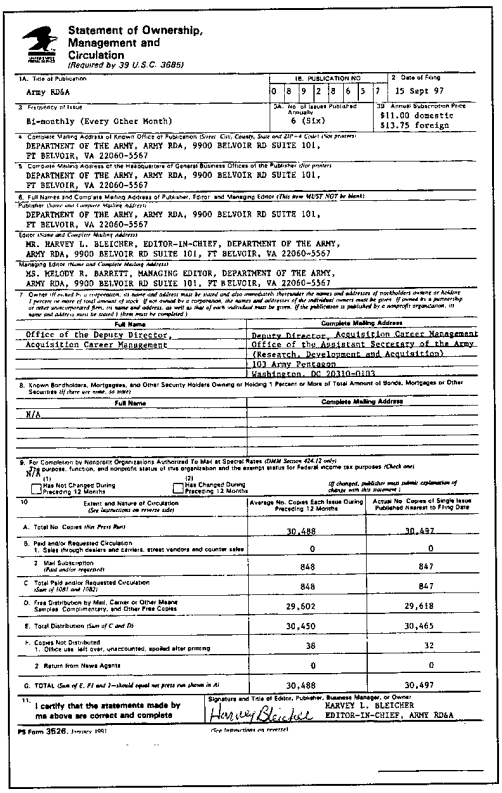
Papers are solicited in the general categories of Smart Structures and Advanced Materials; Microelectronics and Sensors; High-Performance Computing and Simulation; Advanced Propulsion and Power Technologies; Defense Against Weapons of Mass Destruction; Medical and Behavioral Sciences; Environmental Sciences and Geosciences; and Engineering Sciences (including robotics, mechanics, fluid dynamics and survivability.)

Summaries must be submitted in the required format **on or before Dec. 1, 1997,** to: 21st Army Science Conference, 16441 Benns Church Boulevard, Smithfield, VA, 23430, or faxed to (757)357-5108.

To obtain summary format instructions or other conference information, contact Catherine Kominos at commercial (703)697-3558 or DSN 225-3558.

Army Acquisition Corps Annual Holiday Party

LTG Paul Kern, Director of the Army Acquisition Corps (AAC), is hosting the 1997 AAC annual holiday party, Dec. 12, in Washington DC. For information, contact LTC A.J. Castaldo at DSN 227-3191, commercial (703) 697-3191, or e-mail: castalda@sarda.army.mil.



Statement of Ownership, Management and Circulation
(Required by 39 U.S.C. 3685)

1A. Title of Publication	1B. PUBLICATION NO.	2. Date of Filing
Army RD&A	0 8 9 2 8 6 5 7	15 Sept 97

3. Frequency of Issue	3A. No. of Issues Published Annually	3B. Annual Subscription Price
Bi-monthly (Every Other Month)	6 (Six)	$11.00 domestic $13.75 foreign

4. Complete Mailing Address of Known Office of Publication (Street, City, County, State and ZIP+4 (Not printers)
DEPARTMENT OF THE ARMY, ARMY RDA, 9900 BELVOIR RD SUITE 101, FT BELVOIR, VA 22060-5567

5. Complete Mailing Address of the Headquarters or General Business Offices of the Publisher (Not printer)
DEPARTMENT OF THE ARMY, ARMY RDA, 9900 BELVOIR RD SUITE 101, FT BELVOIR, VA 22060-5567

6. Full Names and Complete Mailing Address of Publisher, Editor, and Managing Editor (This item MUST NOT be blank)
Publisher (Name and Complete Mailing Address)
DEPARTMENT OF THE ARMY, ARMY RDA, 9900 BELVOIR RD SUITE 101, FT BELVOIR, VA 22060-5567
Editor (Name and Complete Mailing Address)
MR. HARVEY L. BLEICHER, EDITOR-IN-CHIEF, DEPARTMENT OF THE ARMY, ARMY RDA, 9900 BELVOIR RD SUITE 101, FT BELVOIR, VA 22060-5567
Managing Editor (Name and Complete Mailing Address)
MS. MELODY R. BARRETT, MANAGING EDITOR, DEPARTMENT OF THE ARMY, ARMY RDA, 9900 BELVOIR RD SUITE 101, FT BELVOIR, VA 22060-5567

7. Owner (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given. If the publication is published by a nonprofit organization, its name and address must be stated.) (Item must be completed.)

Full Name	Complete Mailing Address
Office of the Deputy Director, Acquisition Career Management	Deputy Director, Acquisition Career Management Office of the Assistant Secretary of the Army (Research, Development and Acquisition) 103 Army Pentagon Washington, DC 20310-0103

8. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages or Other Securities (If there are none, so state)

Full Name	Complete Mailing Address
N/A	

9. For Completion by Nonprofit Organizations Authorized To Mail at Special Rates (DMM Section 424.12 only)
The purpose, function, and nonprofit status of this organization and the exempt status for Federal income tax purposes (Check one)
N/A
(1) ☐ Has Not Changed During Preceding 12 Months ☐ Has Changed During Preceding 12 Months (2) (If changed, publisher must submit explanation of change with this statement)

10. Extent and Nature of Circulation (See instructions on reverse side)	Average No. Copies Each Issue During Preceding 12 Months	Actual No. Copies of Single Issue Published Nearest to Filing Date
A. Total No. Copies (Net Press Run)	30,488	30,497
B. Paid and/or Requested Circulation 1. Sales through dealers and carriers, street vendors and counter sales	0	0
2. Mail Subscription (Paid and/or requested)	848	847
C. Total Paid and/or Requested Circulation (Sum of 10B1 and 10B2)	848	847
D. Free Distribution by Mail, Carrier or Other Means Samples, Complimentary, and Other Free Copies	29,602	29,618
E. Total Distribution (Sum of C and D)	30,450	30,465
F. Copies Not Distributed 1. Office use, left over, unaccounted, spoiled after printing	38	32
2. Return from News Agents	0	0
G. TOTAL (Sum of E, F1 and 2—should equal net press run shown in A)	30,488	30,497

11. I certify that the statements made by me above are correct and complete
Signature and Title of Editor, Publisher, Business Manager, or Owner
HARVEY L. BLETCHER EDITOR-IN-CHIEF, ARMY RD&A

PS Form 3526, January 1991 (See instructions on reverse)

From The Acquisition Reform Office...

Gore Approves Goals for 'DOD Acquisition' NPR Reinvention Impact Center

On July 31, 1997, Vice President Gore approved goals for "DOD Acquisition" as a National Performance Review Reinvention Impact Center (RIC). The initiatives cover the three main areas contained in the Blair House Papers and constitute the hallmark of what the DOD Acquisition RIC will achieve during the second term of the administration. Below are the 12 goals DOD is committed to achieving by the year 2000.

DOD Acquisition Year 2000 3-Year Goals

Delivering Great Service

- Deliver new major defense systems to the users in 25 percent less time.
- Achieve visibility of 90 percent of DOD materiel assets while resupplying military peacekeepers and warfighters and reducing average order to receipt time by 50 percent.
- Simplify purchasing and payment through use of purchase card transactions for 90 percent of all DOD micropurchases while reengineering the processes for requisitioning, funding, and ordering.
- Create a world-class learning organization by offering 40 or more hours of continuing education and training to the DOD acquisition-related workforce.

Fostering Partnership

- With no top-line budget change, achieve annual Defense procurement of at least $54 billion toward a goal of $60 billion in 2001.
- In the spirit of fostering partnerships and community solutions, DOD will complete disposal of 50 percent of the surplus property baseline and privatize 30,000 housing units.
- Decrease paper transactions by 50 percent through electronic commerce and data interchange.
- Reduce total release of toxic chemicals by an additional 20 percent.

Internal Reinvention

- Eliminate layers of management through streamlined processes while reducing the DOD acquisition-related workforce by 15 percent.
- Define requirements and establish an implementation plan for a cost accounting system that provides routine visibility into weapon system life cycle costs through activity-based costing and management. The system must deliver timely, integrated data for management purposes to: permit understanding of total weapon costs; provide a basis for estimating costs of future systems; and feed other tools for life cycle cost management.
- Dispose of $2.2 billion in excess National Defense Stockpile inventories and $3 billion in unneeded government property while reducing supply inventory by $12 billion.
- Minimize cost growth in major Defense programs to no greater than 1 percent annually.

Army Contracting for the 21st Century Booklet

In June 1997, the Office of the Deputy Assistant Secretary of the Army (Procurement) published the *Army Contracting for the 21st Century* booklet. The booklet describes the story of Army contracting and defines its goals and strategic focus. It also describes some Army contracting accomplishments and points the way to the future. Army contracting has led the acquisition reform charge and continues to innovate to provide our soldiers the best possible support now and in the 21st century. For copies of the booklet, contact Melissa Pittard at (703)681-9155 or e-mail your request to: pittardm@sarda.army.mil.

Update On Strategic Planning For Acquisition Reform

On Aug. 6, 1997, Dr. Kenneth J. Oscar, Acting Assistant Secretary of the Army (Research, Development and Acquisition), released an assessment of the progress being made by Army major commands and program executive offices in implementing the Army Acquisition Reform Strategy. Acquisition reform strategic planning began on Sept. 22, 1996. Major commands and program executive offices were to incorporate the Army Acquisition Reform Strategy into their organizational strategic planning process and comply with the Army "Guidelines for Acquisition Reform Strategic Planning." The product was to be their Acquisition Reform Improvement Plan. This plan was to be posted to an Acquisition Reform Home Page on the Internet.

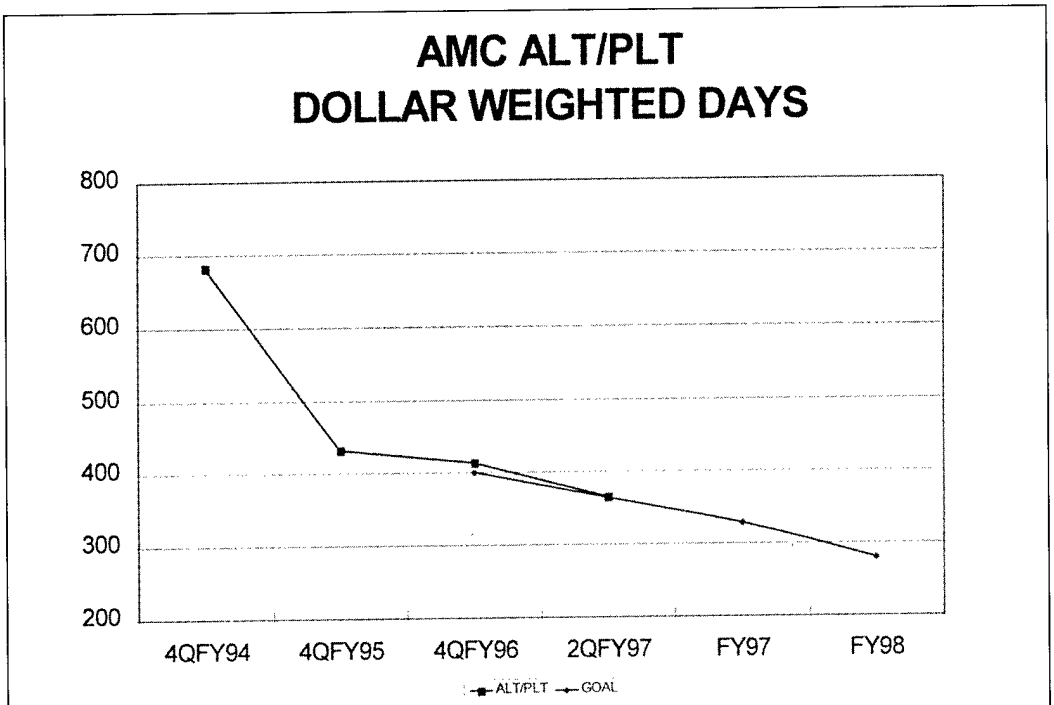
The assessment shows the results emerging from acquisition reform strategic planning activities as of July 28, 1997. Major commands that get good marks for their initial efforts are the U. S. Army Forces Command, the U. S. Army Materiel Command and the U. S. Army Space and Strategic Defense Command. The program executive offices that get good marks are Air and Missile Defense; Intelligence, Electronic Warfare and Sensors; and Tactical Missiles. The assessment and its appendices can be downloaded from http://acqnet.sarda.army.mil/acqref/acqref3.htm.

Dr. Oscar encouraged the continuation of this vitally important acquisition reform strategic planning process in a timely manner. He announced that another assessment of the AR strategic planning progress and results would be performed in January 1998.

AMC Reduces ALT/PLT For Dollar Weighted Secondary Items

In a memorandum dated July 11, 1997, GEN Johnnie Wilson, Commanding General, Army Materiel Command (AMC), informed the Army Chief of Staff of AMC's continuing success in reducing the dollar weighted Administrative Lead Time/Production Lead Time (ALT/PLT) days for its secondary items. Since FY94, AMC reduced the dollar weighted ALT/PLT by 47 percent, from 683 days to 365 days. According to the latest data obtained from the Logistics Management Institute (March 1996), only the Defense Logistics Agency has a shorter cycle time than the Army. The accompanying chart illustrates AMC's progress.

AMC uses ALT/PLT days in its inventory management system to determine the quantity and value of items needed to meet demand during the time required to order and receive replenishment stocks. The formula used to calculate dollar weighted ALT/PLT days is contained in DOD 4140.1-M *Secondary Item Stratification Manual.* Since FY90, the total value of the items needed to cover the ALT/PLT cycle time has been reduced from $10.3 billion to $2.1 billion. This 80 percent reduction is not all attributable to ALT/PLT, but it clearly demonstrates AMC's aggres-



	4QFY94	4QFY95	4QFY96	2QFY97	FY97	FY98
ALT/PLT	683	432	413	365		
GOAL			400	364	328	280

SOURCE= Budget Stratification Report

sive inventory reduction efforts.

In the memo to the Army Chief of Staff, GEN Wilson attributed success so far to several key initiatives. These included the use of flexible long-term contracts, electronic ordering, zero tech loop (updating technical data packages prior to the actual requirement), and automation. Above all else, GEN Wilson attributed AMC's success to teamwork. Item managers, engineers, and contracting personnel worked together to ensure AMC bought the right equipment and supplies in a timely manner. AMC is seeking partnering relationships with its major secondary item suppliers to tackle PLT reductions. GEN Wilson believes further reductions beyond the FY98-03 Program Objective Memorandum promise of 300 days are achievable, and he established a stretch goal of 280 days for the end of FY98.

Army Enterprise Metrics Update

More Army-level enterprise metrics were added to the Army Acquisition web site at http://acqnet.sarda.army.mil/acqref under the title "AR Metrics" in late August 1997. With the added metrics, the metrics page was reorganized by categories as reflected below:

- Cost-Related Metrics
  - Annual Rate of Program Cost Change
  - Cost in Cents per Dollar Purchasing
- Schedule-Related Metrics
  - AMC Administrative/Procurement Administrative Lead Time
- Performance-Related Metrics
  - Number of Contractor Protests
  - Army Major Defense Acquisition Program (MDAP) Breaches
- Acquisition Reform Initiatives Metrics
  - Value Engineering Change Proposals (VECPs)
  - DAWIA Certification
  - Single Process Initiative
  - MILSPECs/STDs Reform
  - Credit Card Usage
  - EC/EDI/FACNET
- Contract Actions Metrics
  - By Ordering Method
  - By Contract Competition
  - By Business Type
  - By Solicitation Methods
  - Multiyear Contracts
- Links to Other Metrics
  - Army Contracting Fact Book

For additional information on Army metrics, contact Dr. A. Kim at (703) 681-9318, or email: kima@sarda.army.mil.

For additional information on Acquisition Reform, contact LTC L. Hooks on (703) 681-9479, or e-mail: booksl@sarda.army.mil.

BOOKS

The Team Handbook, Second Edition

By Peter R. Scholtes, Brian L. Joiner, and Barbara J. Streibel, Joiner Associates Inc., 1996

Reviewed by LTC Kenneth H. Rose (USA, Ret.), a project manager with the Waste Policy Institute in San Antonio, TX, and a former member of the Army Acquisition Corps.

Teams are here to stay. They provide the responsiveness and versatility necessary for success in a project management environment that more traditional organization structures do not. Yet, their application is often a mystery for those raised on hierarchy and command-and-control. On the bookshelf of team literature, *The Team Handbook, Second Edition,* by Peter R. Scholtes, Brian L. Joiner, and Barbara J. Streibel, stands out as a singular source of how-to guidance for those who would tap the power of teams now and in the future.

The book is more a down-to-earth shop manual than a handbook. It is meant to be used on the job. Its spiral binding allows easy, lay-flat use. Information is organized in a consistent, visually oriented format that facilitates indexing, identifying key points, and making marginal notes. It includes specific sidebar elements that offer brief tips, cautions, highlights, and background information.

The Team Handbook comprises seven chapters and four supporting appendices. The Foreword, written by Peter Scholtes, includes an admonition that teams are not the solution to every problem. Teams are one of many available tools. When they are used, they must be applied within a larger system of planning, priorities, leadership, and training. This new second edition goes beyond the cross-functional team scope of the previous edition to include management teams, new product development teams, and natural work groups.

Chapter 1 provides a conceptual foundation for team application, linked to associated specifics on quality programs in Appendix A. The chapter includes an insightful team development model that displays the relationship among six interacting elements of a team environment.

Team tools are described in Chapter 2. While this information is available from many other sources, Ishikawa's *Guide to Quality Control* for example, the handbook presents it concisely, from a hands-on point of view. A matrix describing when to use the tools answers the "So what?" question that can plague a strictly academic presentation.

Chapters 3 and 4 are especially useful to managers. The former deals with getting things started. It includes a description of things to be done and checklists and worksheets for ensuring complete execution. In consonance with the cautionary note in the Foreword, this chapter describes four types of projects that would not be appropriate for team application. Chapter 4 addresses a critical aspect of team operation—the meeting. It provides practical principles for planning meetings, conducting effective discussions, making effective decisions, and keeping records. It then applies these principles in a notional scenario for initial and recurring team meetings. Again, simple yet complete checklists provide a path to successful implementation.

Problem solving and process improvement are the subjects of Chapter 5. Both are presented as alternate, related approaches to improvement. The trademarked Joiner 7 Step Method is offered as the preferred problem-solving approach. Appendix B shows an example of how storyboards may be used to summarize problem-solving efforts. A five-step plan for process improvement is also presented. The method and plan are explained in detail, as are 15 improvement strategies that may be tailored to a specific situation under either approach. This chapter is much more than the shirt pocket guide familiar to many readers. It is a comprehensive, step-by-step treatment of team techniques that many view as intuitional until they have to apply them to real tasks.

Chapter 6 gets to the thorny issue of people working together. It describes the four stages of team growth—forming, storming, norming, and performing. It also provides a 10-ingredient recipe for a successful team. Each ingredient describes an ideal situation, indicators of potential trouble, and recommendations. It concludes with suggestions for giving and receiving feedback, which is described as "The single most important skill to have in working through any problem..."

Conflict is a natural part of progress. Chapter 7 deals with the issues of groupthink, common responses to conflict, and conflict resolution. It also describes 10 common problems, such as floundering, reluctant participants, and feuding team members, and suggests methods for dealing with them.

Appendix C contains warm-up exercises related to techniques described throughout the book. Appendix D is a useful listing of sources for further information.

The Team Handbook, too, is here to stay. A walk through any program office is likely to reveal several well-thumbed copies. Regrettably, such a tour may also disclose a few pristine, never-been-opened examples. Like any user's guide, this book cannot guide if it is not used. *The Team Handbook* shows the way to improved team performance as the path to improved operational performance. Anyone associated with teams in the workplace—sponsors, leaders, members—would be well-served by thorough familiarity with its contents.

LETTERS

Dear Sir:

Having just read the article, "Global Technical Data Support to the 21st Century Military" (July-August 1997 issue of *Army RD&A*), I am struck by the dichotomy between this article and Acquisition Reform tenants. The drive to buy commercial and use contractor logistics support seems to be at odds with the first sentence of the article "Technical data is the foundation of the Army's warfighting arsenal."

I am sure significant dollars are continuing to be spent on the Integrated Data Environment the article touts, however, there is only a passing reference to how this system might handle commercial specs, if the contractor wants to make them available. This program is just one of many that is caught in the Acquisition Reform dilemma. I think everyone realizes that with the Army's scarce resources we must begin to look at legacy systems and see if they fit in the new acquisition process. I think it would be useful if your magazine started a dialog on what "old" systems should be dropped or significantly modified if we are going to use commercial systems.

Robert J. Radkiewicz
HQ, Industrial Operations Command

ARMY RD&A WRITER'S GUIDELINES

About Army RD&A

Army RD&A is a bimonthly professional development magazine published by the Office of the Assistant Secretary of the Army (Research, Development and Acquisition). The address for the Editorial Office is: DEPARTMENT OF THE ARMY, ARMY RDA, 9900 BELVOIR RD SUITE 101, FT BELVOIR VA 22060-5567. Phone numbers and e-mail addresses for the editorial staff are as follows:

Harvey L. Bleicher, Editor-in-Chief	bleicheh@aaesa.belvoir.army.mil	(703)805-1035/DSN 655-1035
Melody R. Barrett, Managing Editor	barrettm@aaesa.belvoir.army.mil	(703)805-1036/DSN 655-1036
Debbie L. Fischer, Assistant Editor	fischerd@aaesa.belvoir.army.mil	(703)805-1038/DSN 655-1038
Herman L. Surles, Assistant Editor	surlesh@aaesa.belvoir.army.mil	(703)805-1034/DSN 655-1034
Sandra R. Marks, Technical Review	markss@aaesa.belvoir.army.mil	(703)805-1007/DSN 655-1007
		Datafax: (703)805-4218/DSN 655-4218

Purpose

To instruct members of the RD&A community relative to RD&A processes, procedures, techniques and management philosophy and to disseminate other information pertinent to the professional development of the RD&A community.

Subject Matter

Subjects of articles may include, but are not restricted to, policy guidance, program accomplishments, state-of-the-art technology/systems developments, career development information, and management philosophy/techniques. Acronyms should be kept to a minimum and, when used, be defined on first reference. Articles with footnotes are not accepted.

Length of Articles

Articles should be approximately 1,500 t o 1,600 words in length. This equates to approximately 8 double-spaced typed pages, using a 20-line page.

Photos and Illustrations

Include any photographs or illustrations which complement the article. Black and white is preferred, but color is acceptable. Graphics may be submitted in paper format, or on a 3 1/2-inch disk in powerpoint, but must be black and white only, with no shading, screens or tints. We cannot promise to use all photos or illustrations, and they are normally not returned unless requested.

Biographical Sketch

Include a short biographical sketch of the author/s. This should include the author's educational background and current position.

Clearance

All articles must be cleared by the author's security/OPSEC office and public affairs office prior to submission. The cover letter accompanying the article must state that these clearances have been obtained and that the article has command approval for open publication.

Offices and individuals submitting articles that report Army cost savings must be prepared to quickly provide detailed documentation upon request that (1) verifies the cost savings; and (2) shows where the savings were reinvested. Organizations should be prepared to defend these monies in the event higher headquarters have a higher priority use for these savings. All Army RD&A articles are cleared through SARD-ZAC. SARD-ZAC will clear all articles reporting cost savings through SARD-RI. Questions regarding this guideline can be directed to SARD-ZAC, Acquisition Career Management Office, (703)695-6533, DSN 255-6533.

Submission Dates

Issue	*Author's Deadline*
January-February	15 October
March-April	15 December
May-June	15 February
July-August	15 April
September-October	15 June
November-December	15 August

Authors should include their address and office phone number (DSN and commercial) with all submissions, **as well as a typed, self-adhesive label containing their correct mailing address**. In addition to providing a printed copy, authors should submit articles on a 3 1/2-inch disk in MS Word, or ASCII format. Articles may also be sent via e-mail to: bleicheh@aaesa.belvoir.army.mil

ARMY RD&A
ISSN 0892-8657

DEPARTMENT OF THE ARMY
ARMY RDA
9900 BELVOIR RD SUITE 101
FT BELVOIR VA 22060-5567